Understanding the Role and Value of Participatory Mapping in an Inuit Knowledge Research Context

By

Alex de Paiva

A thesis submitted to the Faculty of Graduate and Postdoctoral Affairs in partial fulfillment of the requirements for the degree of Master of Arts
In Geography

Carleton University,
Ottawa Ontario

©2017, Alex de Paiva
Abstract

Participatory mapping has had a long history in the Arctic, particularly since the Inuit Land Use and Occupancy Project (ILUOP) undertaken from 1973 - 75. Despite its widespread use, there has been little critical assessment of the role and value of participatory mapping in an Inuit cultural context. In particular, this study investigates the role and value of participatory mapping for learning, documenting, and representing Inuit cultural and geographical knowledge through both a comprehensive literature review and key informant interviews. Findings indicate that methods employed have largely remained consistent from the ILUOP to present. Participatory mapping is seen as valuable both for how it can record Inuit knowledge, as well as for the process of engagement that it supports. The role and value of participatory mapping is also discussed in relation to meeting diverse project objectives and the ability to facilitate knowledge exchange.
Acknowledgements

I would like to thank Dr. Gita Ljubicic and Dr. Scott Mitchell for the amazing support they provided throughout the development of this project. Without their guidance and support this project would not be possible.

I would like to thank the key informants who agreed to participate in this study. Your valuable insights allowed for this project to take its current shape.

I would also like to thank the faculty and staff of the Department of Geography and Environmental Studies for the encouragement throughout this process, and to all the great friends that made the late nights and long hours a truly wonderful experience.

Finally I am grateful for having a supportive family that always offered encouragement when my motivation suffered. Your ongoing support made this process possible.
## Contents

Abstract ................................................................................................................................. 1

Acknowledgements .................................................................................................................. 2

List of Tables .......................................................................................................................... 6

List of Figures .......................................................................................................................... 7

List of Acronyms ..................................................................................................................... 8

Chapter 1: Introduction .......................................................................................................... 9

1.1 Research Questions ......................................................................................................... 10

1.2 Study Area Context ......................................................................................................... 11

1.3 Organization of Thesis ...................................................................................................... 12

Chapter 2: Background .......................................................................................................... 14

2.1 Identifying the Importance of Maps: Power and a Colonial Legacy ................................. 14

2.1.1 What is a Map? ........................................................................................................... 14

2.1.2 Mapping as a Part of Colonial Control ...................................................................... 16

2.2 A Critical Cartographic Approach .................................................................................. 19

2.2.1 Emergence of Critical Cartography ......................................................................... 19

2.3 The Power of Maps .......................................................................................................... 20

2.3.1 Participatory Mapping ............................................................................................... 21

2.3.2 Emergence and Use of Participatory Mapping ............................................................ 23

2.3.3 Participatory Mapping in the Arctic .......................................................................... 26

Chapter 3: Methods ............................................................................................................... 28

3.1 A Critical Cartographic Approach .................................................................................. 28

3.2 Methodological Approach ............................................................................................. 28

3.2.1 Comprehensive Literature Review .......................................................................... 28

3.2.2 Key Informant Interviews ....................................................................................... 33

Chapter 4: Literature Results ............................................................................................... 40

4.1 Sources of Participatory Mapping Literature ................................................................... 40

4.2 Methods Employed ......................................................................................................... 42

4.3 Mapping Objectives ........................................................................................................ 47

4.4 Uses of Participatory Mapping in the Arctic ................................................................... 50

4.4.1 Land Claims .............................................................................................................. 50

4.4.2 Educational Management ......................................................................................... 53

4.4.3 Education and Outreach ........................................................................................... 58
## Chapter 7: Concluding Thoughts

- **7.1 Uses of Participatory Mapping in Inuit Knowledge Research over the Last 40 Years** ........................................... 115
- **7.2 Extent of Participatory Mapping for Knowledge Exchange and Documentation** ......................... 117
- **7.3 Barriers and Considerations of Participatory Mapping** ................................................................. 118
- **7.4 Future Opportunities of Participatory Mapping** ........................................................................... 119
- **7.5 Study Shortcomings, Contextual Considerations, and Future Research** ..................................... 120
- **7.6 Conclusions: The Role and Value of Participatory Mapping in the Arctic** ................................. 121

## References ......................................................................................................................................................... 123

## Appendix 1: Recruitment Email .................................................................................................................. 133

## Appendix 2: Interview Guide ......................................................................................................................... 134

## Appendix 3: Consent Form ............................................................................................................................ 138

## Appendix 4: Practitioner Backgrounds and Areas of Experience ........................................................... 140
List of Tables

Table 3.1: Search Terms Used in Database Searches.........................................................32
Table 3.2: Sources of Literature.........................................................................................33
Table 3.3: Coding Scheme Employed in Literature Review.............................................35
Table 3.4: Practitioners Interviewed By Areas of Experience........................................40
Table 4.1: Publication Sources Gathered That Included Participatory Mapping as a Research Method........................................................................................................44
Table 4.2: Methods of Recording Information in Participatory Mapping.......................46
Table 4.3: Scales Used While Undertaking Participatory Mapping Initiatives.................49
Table 4.4: Stated Mapping Objectives in Publications Reviewed......................................51
Table 4.5: Features Mapped In Reviewed Publications....................................................52
List of Figures

Figure 4.1: Collective lifetime caribou harvesting areas used by Elders of Baker Lake and Arviat, Nunavut..........................................................58

Figure 4.2: Map of Igloolik Island, Nunavut.................................................................62

Figure 4.3: Example of participatory mapping being used to facilitate discussions of Inuit knowledge and use of sea ice in Pangnirtung, Nunavut..............................................65
List of Acronyms

**BNL**: Basic Needs Level

**CBPR**: Community Based Participatory Research

**COSEWIC**: Committee on the Status of Endangered Wildlife in Canada

**DFO**: Department of Fisheries and Oceans

**ESRI**: Environmental Systems Research Institute

**GIS**: Geographic Information Systems

**GPS**: Global Positioning System

**HTO**: Hunters and Trappers Organization

**IFAD**: International Fund for Agricultural Development

**ILUOP**: Inuit Land Use and Occupancy Project

**NCRI**: Nunavut Coastal Resources Inventory

**NTS**: National Topographic System

**NPC**: Nunavut Planning Commission

**NWHS**: Nunavut Wildlife Harvest Study

**NWMB**: Nunavut Wildlife Management Board

**PGIS**: Participatory Geographic Information Systems

**PRA**: Participatory Rural Appraisal

**RRA**: Rapid Rural Appraisal

**SAR**: Synthetic Aperture Radar

**TEK**: Traditional Ecological Knowledge

**WHS**: Wildlife Harvest Study
Chapter 1: Introduction

Participatory mapping methods have been used throughout the world to facilitate Indigenous land claims (e.g. Sparke, 1998; Chapin et al., 2005; Bryan, 2011; Smith et al., 2017), to support environmental management (e.g. Feinberg et al., 2003; Cronkelton et al., 2010; McCarthy et al., 2012; Gill and Lantz, 2014), and to document local knowledge (e.g. Aswani and Lauer, 2006; McKenna et al., 2008). Due to the widespread use of participatory mapping as a participatory methodology, lively debate has ensued around critically assessing the value of this method in achieving project goals and objectives.

In *Ground Truth*, Pickles (1995) evaluated the role of Geographic Information Systems (GIS) and other mapping approaches in relation to the role they could play in community empowerment. Much of this debate centered on longstanding critiques of the positivist nature of GIS and cartography (how cartography can sometimes leave out contextual, ‘human’ elements of maps) such as Harley (1988) or Lake (1993), and the emerging use of GIS for community engagement and empowerment (Elwood, 2006). This debate provided a platform for the development of more participatory technologies, and encouraged assessment of how those technologies were being used for the purpose of engaging and empowering communities (Craig et al., 2002; Chambers, 2006; Elwood, 2006; Harris, 2004).

Alongside critical assessment of GIS for community empowerment, the use of maps generated through participatory means have more generally been the subject of critique. Used extensively for land claims in Latin America, participatory mapping has been reviewed for the role and value it plays in engaging and empowering local
communities. Assessing participatory mapping as used for Miskito land claims, Bryan (2011) reviewed its role in delineating Indigenous lands. Conclusions from this study indicate that while maps are necessary to represent Indigenous land claims, the utopian view that practitioners of participatory mapping have sometimes held whereby maps fully represent Indigenous knowledge in an Indigenous worldview is not always accurate (Warren, 2004). Maps are thus forced, at times, to “walk the line” between meeting needs of Indigenous groups and representing Indigenous territories in a westernized way (Bryan, 2011, pp. 41). Similarly, Smith et al. (2017) reviewed participatory mapping practices in the context of Latin American claims revealing that while maps might not fully serve to empower communities and address greater societal inequalities, they are an important step in delineating Indigenous lands.

While these critical assessments of participatory mapping may fuel some debate, they are valuable at indicating the role and value that maps can play in their respective contexts. Although participatory mapping has been used extensively in the Arctic for similar objectives as elsewhere in the world, there is a lack of critical assessment surrounding the role and value of participatory mapping as a method in facilitating Inuit knowledge research. This thesis seeks to undertake initial steps in addressing this gap, and to begin a critical analysis of participatory mapping within an Inuit geographical and cultural context.

1.1 Research Questions

This thesis investigates the role and value of participatory mapping in the context of Inuit knowledge research in the Arctic, and is guided by four research questions:
1. How has participatory mapping been used from the ILUOP to present (i.e. over the last 40 years)?

2. To what extent has participatory mapping been used in sharing and exchanging knowledge in Inuit knowledge research?

3. What key barriers and considerations exist in using participatory mapping?

4. What future opportunities exist for participatory mapping in an Inuit knowledge research context?

These questions have been addressed through two key research phases. During the first phase a comprehensive literature review was undertaken to examine all the literature that describes using participatory mapping in an Inuit knowledge research context from 1976 – present. This review seeks to better understand how participatory mapping has been used, for what purposes, and how this may have changed over the last 40 years.

During the second phase of research key informant interviews were conducted with experienced practitioners of participatory mapping. This allowed a better understanding of how maps are used for documenting and exchanging knowledge, barriers and considerations that exist, and what future opportunities exist for participatory mapping in an Inuit knowledge research context.

1.2 Study Area Context

The literature reviewed and the key informant interviews were selected based on research undertaken in the four Inuit settlement regions in Canada and the Alaskan Arctic. In Canada this includes Nunatsiavut (northern Labrador), Nunavik (northern
Québec), Nunavut, and the Inuvialuit Settlement Region (northern Northwest Territories).

1.3 Organization of Thesis

This thesis introduction is followed by Chapter 2, “Background”, which provides a description of the importance of maps, colonial history of how maps have been used, the emergence of participatory mapping, and a discussion of critical cartography. This chapter provides important context around participatory mapping, while also demonstrating the need for assessing the role and value of participatory mapping in an Inuit knowledge research context.

In Chapter 3, “Methods”, the conceptual frameworks and methods employed in this research are described. This chapter explains the critical cartographic approach that informs the analysis in this research, and outlines the methods used in undertaking the literature review and key informant interviews according to key phases.

Chapter 4, “Literature Results”, discusses and analyzes results of the literature review in two main sections. The first section presents key metrics and summarizes empirical findings from the literature. These include methods employed, features being mapped, and objectives of mapping projects. In the second section a qualitative review is undertaken, attempting to assess the role and value of participatory mapping based on available literature.

Chapter 5, “Interview Results”, is organized around the major themes of interest discussed in interviews, including: methods, representation, application, and ethics of
participatory mapping. Each section highlights findings from the interviews, along with an analysis of the importance of these findings and how they contribute to a deeper understanding of the role and value of participatory mapping in an Inuit knowledge research context.

Chapter 6, “Discussion”, brings together interpretations from the literature review and interviews, and highlights key findings and contributions of this study. This takes the form of comparing and contrasting findings from the previous two chapters, and situating these findings within the broader participatory mapping literature.

Finally, Chapter 7 concludes the thesis with a summary of how research questions were addressed, and identifies some future areas for research and consideration.
Chapter 2: Background

To critically assess the role and value of participatory mapping in Inuit knowledge research, it is important to begin with a review of the power of maps and their colonial legacy. A critique of traditional mapping then highlights the need to critically assess the role of maps in constructing knowledge. Finally, this chapter discusses the emergence of participatory mapping and how it has been used in the Arctic.

2.1 Identifying the Importance of Maps: Power and a Colonial Legacy

Important to understanding the role and value of participatory mapping is understanding why maps are used, and what power maps hold. While participatory mapping might be undertaken to engage with participants in a different way than conventional mapping (Wood et al., 2010), maps are still central to gathering, recording, and visualizing geographic information. The following overview provides a brief description of what constitutes a map, the power of maps, and considerations for visual representations of space.

2.1.1 What is a Map?

One definition of a map is that it is an object or tool through which to visualize space. Drawing from the theories presented by Bruno Latour in *Science in Action* (1987), maps can be considered as *instruments* that are used in the translation of knowledge, in many cases geographic knowledge. In other words, the map can be considered an *actor*, inherent with agency and capable of shaping relationships between people, and
between people and the natural world. Although Latour has been criticised for overemphasising the agency of the instrument (in other words not recognizing different power relations that might be at play between actors), it still offers a viable explanation of what a map is, or, what a map can accomplish. Using the idea of a map as an instrument it can be inferred that a map is designed to accomplish something. It is central towards the transmission and translation of knowledge, in this case geographically specific knowledge about people and places. A map is therefore designed to shape understanding of space (Dodge, 2015).

Thinking of maps as instruments of knowledge, while useful, is still limited. It is important to consider the critique of Latour’s idea of instruments. If the notion is that a map is an instrument that acts to transmit knowledge, a further look must be taken at how and what knowledge is being produced and shared.

According to Wood et al. (2010), maps are designed to do work. Not just metaphorical work, but real work, achieving both a physical and social objective. Rather than being neutral visualizations of space, maps are imbued with power relations, and power is the ability to get work done (Ibid.). Examples of maps doing work include the obvious: garbage route maps; voter registration maps; and land use planning maps. Maps however also function to accomplish unintentional work, or achieve unintended social outcomes. This might include shaping social knowledge unknowingly through features such as borders, or locations of places, objects, and people. Maps therefore have great power to accomplish physical goals, as well as the power to change understandings of the space around us. According to Dodge (2015), the real power of
maps lies in “their ability to represent reality in a believable way” (pp. 290), shifting perceptions about the surrounding world.

2.1.2 Mapping as a Part of Colonial Control

Maps have long been instrumental to societies around the globe, allowing for territory to be understood and delineated, and to facilitate travel and movement. While uses have varied, mapping has also served to support colonial interests in claiming territory, even being referred to as the “science of princes” (Harley, 1988, pp. 282). This section reviews the colonial uses of maps, and how this led to critiques of cartographic approaches and the emergence of critical cartographic theory.

Emerging from European explorations in the 14th and 15th century, maps developed in order to visually delineate discoveries of new worlds, or as stated by Sauer and Leighly (1927), to return the fruits of discovery to the imperial powers. Foucault (1980) argued that maps served to collect information. Information, he argued, was only useable in its raw form to exert power over another. While Foucault was arguing that maps contributed to “tactics of power” (p. 77), in essence he was describing how they visually represented space in a way that benefited the colonizer.

In the Arctic, mapping has long played a role in representing colonial ambitions. Largely encouraged by the British obsession with finding a Northwest Passage, mapping served the dual purpose of expanding territorial control over the North while also locating key resources for exploitation. Interestingly, Inuit played an integral role in the creation of these Arctic maps, often contributing valuable information in the form of
wayfinding advice or the location of natural resources (Ionescu et al., 2011). It was not uncommon for early European explorers to inquire about places only to have Inuit draw maps covering vast distances either in the snow, or on the parchment provided. In 1824 William Parry used an Inuit-drawn map while travelling through the Foxe Basin, later stating that had he not been provided with this map he would have missed the Foxe channel all together (Lewis, 1998). In a similar circumstance nearly 40 years later, American explorer Charles Francis Hall used a map drawn by an Inuk to navigate up the coast of Baffin Island. Often noted throughout history as being extraordinarily accurate, Lewis (1998) remarked on the accuracy of Inuit-drawn maps and the importance these maps held for explorers.

While early expeditions seeking to find a Northwest Passage were ultimately unsuccessful, they were successful at ‘filling in maps’ of the Arctic, and were eventually used as tools for expanding continental trade. During the 1600’s, the fur trade was emerging as a lucrative business with the interior of the continent seen as a resource to be tapped into. The maps creating during early Arctic explorations were used as tools to achieve this. Using knowledge of Hudson’s Bay and its tributaries, in 1670 Prince Rupert was granted trading rights to all of Hudson’s Bay and its tributary waters (Pigott, 2011). For the following 150 years the North was gradually drawn into the network of trade that was developing in the continent (Ibid.). In essence, maps created during this age of exploration served to exert colonial control over the Arctic, overlooking Inuit occupancy and long term use of the land.
Although there was a brief interlude in which the Northwest Passage was not at the forefront of the British national consciousness, in the late 1800’s leading into the 1900’s the desire to find and map the Northwest Passage began to re-emerge in the British agenda. Differing from earlier attempts that sought to identify trading routes to the Far East, during these attempts there was a sense of ‘pure exploration’, and ‘exploration for science’ in lieu of exploration for outwardly imperial ambitions (Pigott, 2011). This era saw exploring the north and attempting to find a passage west as much about exploration, mapping, and science, as about the passage itself. Funded heavily by both the British Crown and the British elite, the likes of Sir John Ross, Sir William Parry, and most famously Sir John Franklin, undertook expeditions to find and map the Northwest Passage (Ibid.). While all were ultimately unsuccessful, the British obsession of the 1800’s in search of a Northwest Passage brought back countless maps of what lay to the north and west of Hudson’s Bay. These maps served to shape societal understanding of space, not only through what the maps represented, but also through what the maps left out (Razack, 2003). Harris (2004) elaborated on this by describing how Indigenous peoples in Canada were intentionally left off the map. This ‘blank space’ coupled with renaming of Indigenous territories allowed colonizers to feel justified in ‘taking ownership’ of Indigenous lands (Razack, 2003). Arctic maps produced during this era represented the Arctic as vast ‘wilderness’, being named in the image of British explorers, and justifying the dispossession of Indigenous territory.

In all these examples, maps were used, either intentionally or unintentionally, to exert control over territory. These maps allowed for resources to be identified and
exploited, and allowed for new settlements to establish in Indigenous homelands.

Resulting from the role maps played in the colonial process, critiques began to emerge of the cartographic process. These critiques eventually led to the emergence of critical cartographic theory, and played a role in the development of alternative mapping techniques such as participatory mapping.

2.2 A Critical Cartographic Approach

2.2.1 Emergence of Critical Cartography

Grounded in poststructuralism, critical cartography largely arose from critiques of cartography developed throughout the 20th century (e.g. Sauer and Leighly, 1927; Foucault, 1980; Harley, 1988). Emerging primarily from the works of Jacques Derrida and Michel Foucault, poststructuralism seeks to unpack known ‘truths’ about the world through the use of both deconstruction and discourse analysis (Wylie, 2015). Between the two, the most commonly used approach is discourse analysis. Broadly speaking, discourse analysis could be described as an examination of the practices, representations, and beliefs through which meaning and understanding is produced (Wylie, 2015). From this perspective, understanding the discourse surrounding an issue would enable the researcher to better understand the process through which ideas, objects, and theories are socially constructed.

Emerging during in the late 1980’s through to the mid 1990’s, critical cartography and critical GIS arose as a response to the ethical implications of conventional cartographic processes. Critiquing the power inherent within maps, Harley
(1988) drew from theories of Derrida and Foucault using a poststructuralist approach to examine the practices, representations, and beliefs through which maps produced meaning and understanding. The idea was to examine the process of mapping and underlying values and meanings represented in maps. Harley (1988) outlined three assumptions that guide this critical lens:

1. Maps are not neutral images; rather they are value-laden images, and it is important to recognize that they contribute to the socially constructed world;
2. Maps always have meanings, both hidden and literal; and,
3. Maps contribute to the social construction of knowledge.

Based upon these assumptions, Harley suggested that cartography – and the representations in maps – be analyzed not as the output, but rather as the process of how maps are produced. In this sense, Harley was arguing for a critical lens to be applied to cartography and how cartography shapes understanding of the world. This critical cartography would look to identify what values maps hold, what work they are intended to do, and how maps contribute to the social construction of knowledge.

2.3 The Power of Maps

Considering only the critiques of mapping one might imagine the use of maps for engaging with and empowering communities a paradox of sorts. However, considering Wood et al.’s (2010) ideas that maps have power and are designed to do work, the kinds of work maps do can be reconceptualized. Wood et al. (2010) uses an analogy comparing power in maps to power in physics, whereby: power is the ability to do work,
and work acts to exert physical change in the state of the world. In this sense, the power of maps is the ability to accomplish goals. In the same way that maps have been successfully used as a method of exerting colonial control over space by territorial powers (Harley, 1988), maps have also been used in many counter mapping projects as a method of reasserting control over territory (Sparke, 1998; Peluso, 1995), driving improved environmental management (Feinberg et al., 2003), and as a tool to record local knowledge (Aswani and Lauer, 2006). Elwood (2006) addressed the question of why participatory mapping should continue if critiques of maps can make effective implementation so hard. In response, because “[maps are] a powerful mediator of spatial knowledge, social and political power, and intellectual practice in geography” (p. 693). Knowledge is power, and the process of mapping is in a sense the process of legitimizing knowledge. The production of a map is in essence the plotting of a place into existence (Dodge, 2015). For this reason, mapping has tremendous potential to empower disenfranchised people, and to record knowledge that would be otherwise unavailable.

2.3.1 Participatory Mapping

While participatory mapping can hardly be considered a novel approach to gather, record, and visualize knowledge, participatory mapping has rapidly become a widely used practice over the last 40 years (IAFD, 2009). Although there are no universal definitions of participatory mapping, the International Fund for Agricultural Development (IFAD) describes participatory mapping as “a map-making process that attempts to make visible the association between land and local communities by using
the commonly understood and recognized language of cartography” (IFAD, 2009, pp.8).

This is a process in which maps are created by local communities, with or without the help of an outside organization. Essentially, participatory mapping is an approach towards knowledge research that seeks to gather, record, and visualize local knowledge where local participants and knowledge holders are actively involved in the research process.

As an approach to undertaking community, local, or Indigenous knowledge research, participatory mapping is varied, with a number of different recognized methods and approaches to recording information. Some of these methods include:

- Mental mapping – the discussion of geographic places with or without the use of other mapping techniques (e.g. Feinberg et al., 2003; Smith, 2003; McKenna et al., 2008);
- Sketch maps – the drawing of geographic features on blank sheets of paper, the ground, snow, or a variety of other mediums (e.g. Smith, 2003; Aswani et al., 2006);
- Participatory 3-D modelling – the use of 3-D images of landscape to record information (e.g. Rambaldi and Callosa, 2000; Rambaldi et al., 2007);
- Participatory GIS – the use of a GIS to directly record participant knowledge (e.g. Harris et al., 1995; Dragicevic, 2004; Elwood, 2006; Carver et al., 2009); or,
• Hard copy maps – drawing on topographic or satellite image base maps with coloured markers to record geographic features (e.g. Freeman, 1976; Bennett-Brice, 1977; Fox, 2004).

In essence, participatory mapping approaches are varied, and are largely dependent upon the context of the project. Contextual elements might include the participants involved, available resources, technological expertise, or time required. Similarly, maps can be produced for multiple audiences, such as: local organizations and people, development organizations, and governments (IFAD, 2009).

2.3.2 Emergence and Use of Participatory Mapping

Despite the diversity of methods that have been employed, the proliferation of participatory mapping as a research method can be traced to the emergence of Indigenous land claims (Sparke, 1998), and the broader movement towards more engaged research practices such as Rapid Rural Appraisal (Guy, 1995; Townsley, 1996) and Participatory Rural Appraisal (CIDE, 1990; IAFD, 2009). Facing mounting pressure from proposed resource development projects, the early 1970’s saw a push to settle outstanding land claims between settler state governments and Indigenous peoples (Sparke, 1998; Tobias, 2009). Necessary for this process was the demonstration of long-term use and occupancy of Indigenous lands (Usher, 1992). Tobias (2009) described how the use of lands is illustrated through themes such as harvesting practices, and overall, how a livelihood is made off the land. Differing from this, occupancy is demonstrated through the long-standing relationship of people and land, such as traditional
settlements, significant cultural sites, or place names. Since mapping can serve as a powerful tool to visualize the geographic nature of these relationships with the land, maps were considered ideal for visualizing land use and occupancy. As such, participatory mapping emerged as a recognized approach for gathering, recording, and visualizing Indigenous knowledge for the purpose of supporting legal claims to Indigenous rights and title through the negotiation of land claims agreements. Originating in the context land use and occupancy studies that supported the development of North American land claims such as the Nunavut land claim (Freeman, 1976), or Inuit of Labrador land claim (Brice-Bennett, 1977), participatory mapping has since been used around the world to facilitate hundreds of Indigenous land claims agreements (Usher, 1992; Tobias, 2009).

In addition to land use and occupancy studies, the broader push towards more participatory forms of research has encouraged the ongoing use of participatory mapping as a participatory methodology. Frameworks such as Rural Rapid Appraisal, and Participatory Rural Appraisal have sought to include local communities and stakeholders into decision-making processes (IAFD, 2009). Part of this inclusion has involved the use of local or traditional knowledge, for which participatory mapping has been the most widely used approach (Chambers, 2006; Berkes and Berkes, 2008). Including maps in these approaches has allowed knowledge to be recorded, representing local agendas and giving voice to the stakeholders involved. While some authors such as Harley (1988) have described the role of maps in the colonial process, maps have similarly been co-opted as a tool for empowerment, forming the foundation
of ‘counter mapping’ processes that seek to use maps to represent the values of underprivileged populations, or ‘counter’ the hegemonic mapping practice (Peluso, 1995; Rundstrom, 2009). While it is true that maps have been used to claim Indigenous territory, or write Indigenous peoples off the map (Harris, 2004), it is equally true that maps play an integral role in reclaiming Indigenous territory. Stated by Nietschmann (1995, pp. 37), “more Indigenous territory can be defended and reclaimed by maps than by guns”. While the role of maps, and indeed counter-mapping efforts have been critiqued for the ways they can perpetuate a neoliberal worldview (Mollett, 2011), they also have played an integral role in empowering local peoples (Peluso, 1995).

Worldwide, participatory mapping has been recognized as having the ability to inform local land use decision-making processes (Aswani and Lauer, 2006; Bryan, 2011), occupancy or customary tenure (Freeman, 1976; Bennett-Brice, 1977; Chapin et al., 2005), environmental management (Cronkleton et al., 2010), or traditional land use patterns (IAFD, 2009). As groups such as farmers, hunters, and pastoralists might often have complex use and management relationships with the land, recording and visualizing this information with maps allows for improved decision-making while representing local values. As stated by Aberly (1993) “maps can show a vision... more clearly than a thousand words” (pp. 4). Using participatory mapping, the vision of local peoples and communities can be more clearly represented.

In addition to informing local decision-making processes, participatory mapping has also been widely used for recording cultural information. This can include representing cultural information such as mythology (Warnaby, 2012), sites of
significance (Larkham and Brake, 2011), land use patterns (Feinberg et al., 2003; Smith, 2003; Cronkleton et al., 2010), or more generally a social understanding of the landscape (IAFD, 2009).

Collectively, participatory mapping can be viewed as an approach to engage with local stakeholders, empower communities, and involve knowledge holders in the representation of knowledge (Pound, 2003; Galeana Rodriguez, 2017). As community members are often directly involved with how knowledge is recorded, there is greater control over how knowledge is represented (IAFD, 2009).

2.3.3 Participatory Mapping in the Arctic

While mapping has a long history in the Arctic in support of exploration and identifying key resources, more recent mapping and counter mapping projects have shifted how maps of the Arctic are made and used. Early maps can largely be characterized as maps designed for wayfinding or identification of resources, or as necessary in the colonial process in order to claim territory (Rundstrom, 1990). More recently however, mapping has been used as an approach towards facilitating land claim agreements and documenting long term occupancy, supporting environmental management and decision-making, and documenting cultural knowledge of space (Usher et al., 1992, Sparke, 1998; Kendrick and Manseau 2008; and, Eisner et al., 2012).

Usher et al., (1992) identified the use of participatory mapping projects as a key element of successful land claims across much of Canada and the Arctic. Groups including the Northern Saskatchewan Chippewa, Ontario Cree, and Ojibwa have all used
participatory mapping as a way to demonstrate land use and occupancy (Sparke, 1998).

In an Inuit context, participatory mapping has been instrumental in both the Nunavut land claims agreement (Freeman, 1976), and the Labrador Land Claims Agreement (Bennett-Brice, 1977).

Similar to land claims and demonstration of long term occupancy, participatory mapping has also been a tool used for environmental management and decision-making processes. While there are many examples of this worldwide, in an Arctic context some examples of how mapping has been used include documenting: traditional place names and travel routes (Aporta, 2003); Inuit knowledge of environmental conditions such as sea ice or weather patterns (Laidler et al., 2010); or, Inuit knowledge of wildlife (Kendrick and Manseau, 2008). While maps are still being used in the Arctic as a way to delineate territorial borders, illustrate the location of resources, and wayfinding, participatory mapping initiatives have also been more recently used to empower local peoples in decision-making processes, and to legitimize local ‘non-scientific’ knowledge. Therefore, if we return to Wood et al. (2010)’s idea that maps are designed to do work, the work that these participatory mapping projects are designed to do builds on and expands that of previous Arctic mapping.
Chapter 3: Methods

3.1 A Critical Cartographic Approach

As introduced in Chapter 2, critical cartography seeks to better understand the power inherent within maps and how they shape the social construction of knowledge. For this thesis, I draw on this approach to help guide my critical assessment of the role and value of participatory mapping in an Inuit knowledge research context, based on literature as well as key informant interviews. In particular, I examine how participatory mapping has facilitated knowledge exchange and documentation, and how maps have been used to achieve research objectives. Therefore, my questions center on the process of participatory mapping as much as they do on the products created. This critical lens enables an interpretation of insights from key themes of this study to be better understood in the context of power dynamics and knowledge representation.

3.2 Methodological Approach

3.2.1 Comprehensive Literature Review

This research began with a comprehensive literature review to discern what has been done to date, what approaches have worked and for what purpose, and where gaps might exist. The literature selection, review, and analysis process was guided by my four main research questions (Section 1.2).

3.2.1.1 Gathering Data

Literature was initially identified and selected through the use of keyword searches in online databases, as well as government and non-governmental websites.
Key words used in searches are listed in Table 3.1, and were used in a variety of combinations to identify the most relevant literature.

Table 3.1 Search Terms Used in Database Searches

<table>
<thead>
<tr>
<th>Search Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Arctic&quot;</td>
</tr>
<tr>
<td>&quot;Inuit Knowledge&quot;</td>
</tr>
<tr>
<td>&quot;Human Ecology Mapping&quot;</td>
</tr>
<tr>
<td>&quot;Mapping&quot;</td>
</tr>
<tr>
<td>&quot;Traditional Knowledge&quot;</td>
</tr>
<tr>
<td>&quot;Inuit Wayinding&quot;</td>
</tr>
<tr>
<td>&quot;Participatory&quot;</td>
</tr>
<tr>
<td>&quot;Mapping Knowledge&quot;</td>
</tr>
<tr>
<td>&quot;Traditional Travel&quot;</td>
</tr>
<tr>
<td>&quot;Inuit&quot;</td>
</tr>
<tr>
<td>&quot;Observational Mapping&quot;</td>
</tr>
<tr>
<td>&quot;Maps&quot;</td>
</tr>
</tbody>
</table>

The temporal scope of searches was limited to range from 1976 to present, representing the evolution of participatory mapping from the landmark ILUOP onwards (Tobias, 2009). Along with limiting searches temporally, searches were also limited to keywords found only in the subject, title, and abstract of academic databases. The geographic scope included Inuit regions across the North American Arctic, in Canada and Alaska.

Three academic databases were used to search for available articles (Table 3.2). Following the identification of publications that had used or discussed participatory mapping, I employed snowball approach whereby key relevant citations were identified from articles read, and those citations were gathered and included in the study in an iterative process. This occurred until I felt that a level of saturation was reached, where new articles were difficult to find in academic databases and citations referenced in articles were already included.

While academic work has used participatory mapping methodologies extensively, it was also recognized that government and Inuit organizations have also incorporated participatory mapping into their work over the last 40 years. As such, a
grey literature search was also conducted using a more manual approach of searching publication sections of a number of northern government and Inuit organization websites (Table 3.2).

Table 3.2: Sources of Literature

<table>
<thead>
<tr>
<th>Sources of Literature</th>
<th>Locations Searched</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic</td>
<td>Geobase</td>
</tr>
<tr>
<td></td>
<td>ScholarsPortal</td>
</tr>
<tr>
<td></td>
<td>Jstor</td>
</tr>
<tr>
<td>Government</td>
<td>Government of Nunavut, Ministry of Environment</td>
</tr>
<tr>
<td></td>
<td>Government of Nunavut, Ministry of Culture and Heritage</td>
</tr>
<tr>
<td></td>
<td>Government of NWT, Ministry of Environment and Natural Resources</td>
</tr>
<tr>
<td></td>
<td>Nunatsiavut Government</td>
</tr>
<tr>
<td></td>
<td>Nunavut Planning Commission</td>
</tr>
<tr>
<td></td>
<td>Nunavut Wildlife Management Board</td>
</tr>
<tr>
<td>Inuit Organization</td>
<td>Kativik Regional Government</td>
</tr>
<tr>
<td></td>
<td>Kitikmeot Inuit Association</td>
</tr>
<tr>
<td></td>
<td>Kitikmeot Heritage Society</td>
</tr>
<tr>
<td></td>
<td>Qikiqtani Inuit Association</td>
</tr>
<tr>
<td></td>
<td>Kivalliq Inuit Association</td>
</tr>
<tr>
<td></td>
<td>Inuit Tapiriit Kanatami</td>
</tr>
<tr>
<td></td>
<td>Makivik Corporation</td>
</tr>
<tr>
<td></td>
<td>Inuvialuit Regional Corporation</td>
</tr>
</tbody>
</table>

In total, 118 relevant publications were identified through these various searches. Of these, 36 were later identified as having directly used, or discussed the merits of, participatory mapping, and form the basis of analyzes presented in Chapter 4.

3.2.1.2 Analyzing the Literature

The literature was analyzed using a combination of Nvivo Pro 11 software for facilitating qualitative analysis, and the creation of an Excel database to facilitate
quantitative analysis. Nvivo facilitated a qualitative assessment in that key elements from each publication could be thematically coded during the review process. Thematic coding was based on the stated objectives of participatory mapping, locations of study sites, and methods employed. Additionally, as not all 118 publications used participatory mapping, thematic coding was also used to gather background information surrounding a variety of themes such as: Traditional Ecological Knowledge (TEK) research, participatory mapping worldwide, and innovations in participatory GIS. For publications that used or made direct reference to participatory mapping, the coding scheme listed in Table 3.2 was used. Sections of text were selected according to relevant codes based on the themes identified, especially in relation to uses of participatory mapping.

Table 3.3: Coding Scheme Employed in Literature Review

<table>
<thead>
<tr>
<th>Environmental management</th>
<th>Interview Facilitation</th>
<th>Land claims and occupancy studies</th>
<th>Education and Outreach</th>
<th>Understanding Environmental Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wildlife migration patterns</td>
<td>Mapping as an interview tool</td>
<td>Map biographies for land claims</td>
<td>Teaching cultural information</td>
<td>Observations of climatic changes</td>
</tr>
<tr>
<td>Hunting territories/land use</td>
<td>Gathering cultural information</td>
<td>Proof of occupancy</td>
<td>Returning products to communities</td>
<td>Observed changes in wildlife movement</td>
</tr>
<tr>
<td>Harvest locations</td>
<td></td>
<td>Historic trails</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Habitat</td>
<td></td>
<td>Camping sites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine life</td>
<td></td>
<td>Significant Sites</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As publications were reviewed, coding was applied to sections (from sentences to entire paragraphs) that discussed or exhibited any of the themes. The final product was a series of ‘nodes’, or folders that contained information on which publications used participatory mapping, for what purposes, and how many times publications were coded to different thematic categories. Additionally, these thematic ‘nodes’ could be compiled as Word documents containing sections coded to a particular theme to facilitate qualitative analysis. In cases where sections (pages, paragraphs, or sentences) fit into multiple thematic categories, they were coded multiple times according to each relevant theme. This stated, it is important to understand that the thematic coding did not draw hard lines between categories; rather it sought to best identify a diversity of approaches used in participatory mapping.

In addition to thematically coding papers in Nvivo, a spreadsheet was developed to compile information such as the source of the publication (academic, government, or Inuit organization), methodological details, overarching purpose for undertaking the study, geographic location of focus, features being mapped, and whether or not the publication included maps as a part of results. Following the review of all 118 publications, the spreadsheet contained 92 columns relating to details of the mapping process for each study. When a publication stated a methodological detail (such as the use of hard copy base maps), or stated a feature being mapped, a “1” was used to indicate the presence of that theme in the corresponding field. In so doing, selections could be made showing publications that used particular methods, or publications that
were mapping particular kinds of features. This allowed for a quantitative analysis of
participatory mapping practices as used in the Arctic over the last 40 years.

3.2.1.3 Literature Review Limitations

The literature review was undertaken to be as comprehensive as possible,
according to the temporal and geographic scope described in Section 3.2.1.1. However, I
acknowledge that some literature may still have been missed, despite my best efforts. In
some instances publications cited in certain papers or reports could not be found, and in
others there appeared to be no reference to the use of participatory mapping, despite
statements from colleagues indicating that certain projects had used participatory
mapping extensively. Similarly, there were many cases in which projects I had known to
use participatory mapping had not published findings methodological details, leading to
potential gaps between what is available in the literature and what participatory
mapping has been conducted in practice. Despite this, I believe that this study is
comprehensive in its analysis of available literature, and speaks to broader
methodological trends of using participatory mapping for Inuit knowledge research.

3.2.2 Key Informant Interviews

Interviewing is far more than just ‘having a discussion’, rather it is a way to
gather in depth information from research participants, all the while empowering and
respecting those participants by giving their ideas voice (Dunn, 2010). From the outset
of the project, key informant interviews were planned as a way to better understand
experiences and perceptions of participatory mapping from those who have extensive
experience with its use. Specifically, I was looking to gain insights into the methods
employed, perceptions of how representative maps are, uses and applications of participatory mapping, and ethical considerations when using participatory mapping.

While a comprehensive literature review provides a baseline assessment of how participatory mapping has been used, interviews were designed to gain a more nuanced understanding of how practitioners undertook participatory mapping.

3.2.2.1 Ethics

Prior to starting this research, ethics clearance was approved by the Carleton University Research Ethics Board, including approval of recruitment emails (Appendix 1), consent forms (Appendix 2), and the interview guide (Appendix 3). Upon receiving verbal consent to be interviewed (and recorded), the interview commenced. Following the interview the consent form was filled out to enable interviewees the opportunity to better identify how they would like their contribution shared, based on the conversations had. Interviewees were provided with a variety of options including whether they wanted their name to be used in attributing their contributions, how they wanted to be referenced, if they wanted to be directly quoted, and potential ways of sharing their contributions.

3.2.2.2 Identifying Practitioners

Early in the project design the goal was to involve a diverse range of practitioners in order to represent a variety of experiences. This included identifying academics, government employees, consultants, and employees of Inuit organizations. To identify potential interviewees, in consultation with my supervisors (Dr. Gita Ljubicic and Dr. Scott Mitchell), I generated a list of known experienced practitioners.
Additionally, searches were conducted on both government and Inuit organization websites in order to identify potential contacts based on their positions in their respective organization, and the potential that they would have experience with participatory mapping. Potential interviewees were given a priority ranking based on their experience levels, in order to help establish an order for contacting individuals and circulating invitations. Email was then sent to practitioners inviting them to participate in the study (Appendix 1).

Upon receiving a positive response, interviews were organized to occur by phone, Skype, or in person, if possible. Generally the response rate was low, with more than half of all people contacted not responding. As such, the first several interviews conducted were with academics known by either myself or my supervisors. This included Dr. Gita Ljubicic, whose interview was used as a ‘warm-up’. I acknowledge that this could be perceived as a potential source of bias, however it also provided an opportunity for refining questions and gaining familiarity with interview protocols. In addition, topics covered in the interview had not been previously discussed between us and I was conducting the analysis of responses myself. As the project went on, more responses were received from academics at various universities, government employees, and employees of Inuit organizations. Following receipt of a response expressing interest in participating in the study, participants were forwarded the consent form (Appendix 2) and interview guide (Appendix 3) before the interview. This allowed for prior review, speeding up the interview process, as well as allowing participants to feel more comfortable with the topics being discussed. Additionally, the
consent form was reviewed prior to starting the interview, as well as after the interview was complete in order to ensure that practitioners felt comfortable with sharing what they had said, and how they would be attributed.

In total, 14 interviews were conducted by Skype, phone, or in person, and 1 email conversation was held with an experienced practitioner. These interviews occurred between August 2016 and April 2017. Table 3.3 lists all practitioners interviewed according to their general area of experience, and more detailed descriptions of their backgrounds are provided in Appendix 4. As many practitioners come from a varied background, names may be listed under several areas of experience.
Table 3.4: Practitioners Interviewed by Areas of Experience

<table>
<thead>
<tr>
<th>Academic</th>
<th>Technical</th>
<th>Consulting</th>
<th>Inuit Organization</th>
<th>Northern Government</th>
<th>Northern Institution of Public Governance</th>
<th>Northern Non-Profit Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amos Hayes</td>
<td>Amos Hayes</td>
<td>Bill Kemp</td>
<td>Krista Zawadski</td>
<td>Suzanne Etheridge</td>
<td>Northern Organization Employee</td>
<td>Brendan Griebel</td>
</tr>
<tr>
<td>Bill Kemp</td>
<td>Jared Fraser</td>
<td>Erik Val</td>
<td>Northern Researcher</td>
<td></td>
<td>Jared Fraser</td>
<td>Northern Researcher</td>
</tr>
<tr>
<td>Brendan Griebel</td>
<td></td>
<td></td>
<td>Miguel Chenier</td>
<td></td>
<td>Regional Inuit Association Employee</td>
<td></td>
</tr>
<tr>
<td>Claudio Aporta</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Kaitlin Breton-Honeyman</td>
<td></td>
</tr>
<tr>
<td>Natalie Carter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaitlin Breton-Honeyman</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northern Researcher</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Krista Zawadski</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gita Ljubicic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.2.2.3 The Interview Process

Semi-structured interviews were chosen to maintain a conversational flow, and allow participants the freedom to share information that they felt was relevant to each theme (Dunn, 2010). Additionally, it was thought that semi-structured interviews would allow for a greater ease of discussion, increasing the comfort level of participants. To ensure a conversational flow and coverage of the themes of interest, an interview guide
(Appendix 4) was used with general questions to gain context and spark discussion, including:

- professional background and experience with participatory mapping;
- experience with participatory mapping methods;
- how maps are used to represent knowledge;
- how results of participatory mapping sessions have been applied;
- ethical considerations in mapping processes; and,
- lessons learned and best practices.

Interviews typically lasted between 45 minutes and an hour and a half and were held in person, on Skype or on the phone. At the beginning of each interview participants were asked if they would consent to being recorded. If they agreed the rest of the interview was recorded using an audio recording device, if not hand written notes were used to summarize the key points discussed.

3.2.2.4 Transcribing and Interview Analysis

Following interviews, audio recordings were transcribed verbatim into Word documents. This was done manually to ensure accuracy, while also benefiting from further immersion in the interview discussions. Whenever a key theme would emerge I would stop to highlight that section of the document to make note for future analysis. Following the transcription of the interview, transcripts were reviewed for spelling errors and minor edits were made to language. This included removing words such as: um, eh, hmm, or general repetitions of speech.
The transcripts were then loaded into Nvivo for analysis. Differing from the coding scheme used in the literature review, the coding scheme for interview results used the key themes being discussed during the interview. This included methods, representation, applications, and ethical considerations. The objective when issuing these codes was not to develop a quantitative analysis, but rather to organize participant responses in a way that would allow for thematic qualitative analysis. This helped to align analysis with key project objectives. Following coding, thematic ‘nodes’ were downloaded from Nvivo into Word documents. These thematic compilations form the foundation of the analysis presented in Chapter 5.
Chapter 4: Literature Results

This chapter discusses the results of the literature analysis to better understand who has used participatory mapping in the Arctic, how it has been undertaken, and what has changed over the past 40 years. The findings represent the 36 of 118 publications that were found to have directly used or discussed participatory mapping. I begin by discussing key metrics of the publications reviewed, such as methods, purpose of mapping projects, and features being mapped. This is followed by a qualitative analysis of the role and value of participatory mapping as seen through the literature.

4.1 Sources of Participatory Mapping Literature

Of interest when conducting this research was who, or what organizations were responsible for the use of participatory mapping. While a variety of sources were used to gather literature (Table 3.1), the volume of publications found in each type of source varied dramatically. As can be seen in Table 4.1, academic research represents the majority of the works gathered, followed by government organizations, then Inuit organizations.
Table 4.1: Selected Publications That Include Participatory Mapping as a Research Method

<table>
<thead>
<tr>
<th>Types of Articles</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic</td>
<td>25</td>
</tr>
<tr>
<td>Government</td>
<td>7</td>
</tr>
<tr>
<td>Inuit Organization</td>
<td>4</td>
</tr>
</tbody>
</table>

This suggests that academic research likely drives publications, in terms of describing methods and applications of participatory mapping. It is also important to note that while Inuit organizations and governments had limited publications discussing the use of participatory mapping methodologies, it is understood that these organizations have extensively used participatory mapping for a variety of purposes such as environmental management, preserving cultural heritage, and documenting knowledge for land claims. When undertaking online searches however, much of this work was not publically available. As such, many of the methodologies described in Section 4.2 are a reflection of academic approaches to participatory mapping.
4.2 Methods Employed

4.2.1 Recording Information

Common across nearly all of the publications reviewed, interviews or focus groups were used as a way of gathering participants together to record information. Simply put, interviews and focus groups were the ‘tried and trued’ approach used across different projects from ILUOP to present. The Coral Harbor Final Report (NWMB, 2014) stated that interviews were the preferred approach because they allowed for “Inuit hunters to speak in comfortable surroundings on the subject of living coastal resources” (pp.15). Similarly, Nakashima (1990) described how interviews could improve data gathering by allowing for a broader discussion of a participant’s knowledge base. Collectively, the literature suggests that interviews were the preferred method as they allowed for in-depth discussions surrounding the geographic information being recorded on maps. Individual papers differed, however, in the approach used to record geographic information (Table 4.2).
Table 4.2: Methods of Recording Information in Participatory Mapping

<table>
<thead>
<tr>
<th>Data Gathering</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard copy</td>
<td>27</td>
</tr>
<tr>
<td>Hard Copy and Digital</td>
<td>4</td>
</tr>
<tr>
<td>Aporta, 2003; Aporta, 2004; Aporta, 2009; Laidler et al. 2011</td>
<td></td>
</tr>
<tr>
<td>Digital</td>
<td>8</td>
</tr>
<tr>
<td>Unspecified</td>
<td>4</td>
</tr>
</tbody>
</table>

In the literature, the most prominent method of recording geographical information is the use of hard copy maps, followed by a digital approach and finally a hybrid digital and hard copy map approach (Table 4.2). This is interesting as it shows the continued prevalence of paper maps, despite widespread advances in digital recording technologies such as GIS, interactive atlases, and GPS-based programs (Chambers, 2004; Dodge, 2015). This may be in response to a greater comfort level among practitioners and participants with paper maps. Taylor (2005) and Fox (2004) both noted that participants were generally comfortable using the hard copy maps provided. Reflecting on the use of maps to record Inuit knowledge of sea ice features, Laidler et al. (2010)
described the value of maps as extending beyond just recording information to include triggering memories and facilitating conversation. If there is a lack of comfort with technologies used due to gaps in technological literacy, or poor hardware availability, the process of recording information may not be as engaging or effective.

Although the hard copy map approach represented the majority of the publications analyzed, digital technologies still accounted for 8 of 36 publications (Table 4.2). While there have been numerous digital mapping technologies employed in participatory mapping worldwide (Pickles, 1995; Elwood, 1998; Aswani and Lauer, 2006), almost all the reviewed publications that included digital technology in the Arctic used some kind of GPS device to record information. Examples of this include Aporta (2003) using GPS devices to record trails, or the Igliiniit project (O’keefe et al., 2009; Gearheard et al., 2011) that developed a GPS application to record environmental features. The advantage of this approach was cited as allowing hunters to record information as they went about their daily lives, meaning the research could be as non-intrusive as possible. In that project, the application was customized so that hunters could also record attribute information along with geographic information such as trails and points. This allowed for relatively rich datasets to be collected by community members as they wished. While this project was successful in its implementation, it also faced challenges due to the imperfections of the technology, and costs were too prohibitive to use a similar approach across a wider number of communities. In essence, these barriers combined with the relative comfort level and reliability of hard copy maps offer another explanation for the continued prevalence of hard copy maps over digital.
4.2.2 Scale

In addition to identifying whether a publication used a hard copy or digital approach to recording information, I also documented what scales were being used for base maps (Table 4.3). Scale is an important consideration in any mapping project as it dictates the level of detail and accuracy that can be visualized or represented in the geographic region of interest, and plays an important role in defining the spatial extent of a study area. In an Inuit knowledge context, this is particularly important because of the vast geographic area which is used or travelled by Inuit. If the scale is too small, a regional perspective is enabled but details of specific places might be missing; however, if the scale is too large considerably more detail is shown but the map does not cover enough area and the participant will frequently reference beyond the map. Therefore, it is important to consider the appropriate area of interest for a particular theme of discussion, in order to determine the relevant scale to use in recording Inuit knowledge.

Of the publications reviewed, many did not list the scales used for their basemaps, and of the ones that did, the 1:250,000 scale was most common (Table 4.3). Second most prevalent was the 1:500,000 scale, while a few select studies used larger scale maps (e.g. 1:50,000) or much smaller scale maps (e.g. 1: 1,000,000 or 1: 2,000,000) (Table 4.3).
Table 4.3: Scales Used While Undertaking Participatory Mapping Initiatives

<table>
<thead>
<tr>
<th>Scale</th>
<th>Number</th>
<th>Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:50,000</td>
<td>2</td>
<td>Freeman, 1976; Aporta, 2003</td>
</tr>
<tr>
<td>1:250,000</td>
<td>10</td>
<td>Freeman, 1976; Nakashima, 1990; Ferguson and Messier, 1997; Ferguson et al. 1998; Aporta, 2003; Nunavut Wildlife Management Board, 2004; Laidler and Elee, 2008; Laidler and Ikummaq, 2008; Laidler et al. 2008; Kowalchuk and Kuhn, 2012;</td>
</tr>
<tr>
<td>1:500,000</td>
<td>4</td>
<td>Freeman, 1976; Ferguson and Messier, 1997; Ferguson et al. 1998; Taylor, 2005</td>
</tr>
<tr>
<td>1:1 000,000</td>
<td>1</td>
<td>Nunavut Planning Commission, 2012</td>
</tr>
<tr>
<td>1:2 000,000</td>
<td>1</td>
<td>Nunavut Wildlife Management Board, 2008</td>
</tr>
</tbody>
</table>

These findings indicate a lot of variability in scales chosen, and no clear consensus among the publications on which scale was ‘best’. This variability hints that scales might generally be chosen in order to fit the study area. The *Coral Harbour Final Report* (NWMB 2014) mentioned that the scale was chosen to represent the study area. Similarly, Aporta (2003) described the use of printed satellite images being used to cover a large geographic area. This indicates that there is not likely a ‘best’ scale to use when conducting participatory mapping; rather there is a best scale for representing a particular study area or addressing a particular application.
One additional explanatory factor surrounding the choice of scales is the availability of maps. In the Arctic some map scales are not available, or have only become available recently. In fact this is a common problem with certain scales not being universally available, such as 1:50 000 maps. As such, researchers must also consider map availability when deciding on scale.

4.3 Mapping Objectives

This study sought understanding of not only how participatory mapping has been undertaken, but also how it has been applied. Publications were assessed for their stated objectives of the mapping projects, as well as for the features that were being mapped. Stated objectives were broken down into six main categories: environmental management, education and outreach, understanding environmental change, interview facilitation, land claims, and other (Table 4.4; see Table 3.2 for coding scheme). While there is overlap between mapping objectives, it is clear that environmental management and interview facilitation are the dominant objectives cited when undertaking participatory mapping (Table 4.4). To better understand diversity of these objectives, I also recorded the main features being mapped as an additional metric (Table 4.5). Based on this analysis, wildlife and habitat features represent the largest group being mapped with 15 of 36 publications using participatory mapping to record this information. Another category of note includes publications that recorded trails and campsites representing 8 publications.
Table 4.4: Stated Mapping Objectives in Publications Reviewed

<table>
<thead>
<tr>
<th>Mapping Objectives</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Management</td>
<td>16</td>
</tr>
<tr>
<td>Nakashima, 1990; Ferguson et al. 1998;</td>
<td></td>
</tr>
<tr>
<td>Nunavut Wildlife Management Board, 1998,</td>
<td></td>
</tr>
<tr>
<td>2000, 2004; Dowsley, 2007; Kendrick and</td>
<td></td>
</tr>
<tr>
<td>Manseau, 2008; NCRI, 2008; Gagnon and</td>
<td></td>
</tr>
<tr>
<td>Berteaux, 2009; Kowalchuk, 2010; Gearhe</td>
<td></td>
</tr>
<tr>
<td>heard et al. 2011; Laidler et al. 2011;</td>
<td></td>
</tr>
<tr>
<td>Kowalchuk and Kuhn, 2012; Qikiqtani Inuit</td>
<td></td>
</tr>
<tr>
<td>Association, 2012; Fidel et al. 2014; NC</td>
<td></td>
</tr>
<tr>
<td>RI, 2014</td>
<td></td>
</tr>
<tr>
<td>Interview Facilitation</td>
<td>16</td>
</tr>
<tr>
<td>Muller-Wille, 1989; Nakashima, 1990; Fer</td>
<td></td>
</tr>
<tr>
<td>guson et al. 1998; Nunavut Wildlife Mana</td>
<td></td>
</tr>
<tr>
<td>gement Board, 1998; Fox, 2004; Taylor, 20</td>
<td></td>
</tr>
<tr>
<td>05; Laidler and Elee, 2008; Laidler and</td>
<td></td>
</tr>
<tr>
<td>Ikummaq, 2008; Laidler et al. 2008; NCRI,</td>
<td></td>
</tr>
<tr>
<td>2008; Gagnon and Berteaux, 2009; Larkha</td>
<td></td>
</tr>
<tr>
<td>m and Brake, 2011; Pearce et al., 2011;</td>
<td></td>
</tr>
<tr>
<td>Nunavut Planning Commission, 2012; Fidel</td>
<td></td>
</tr>
<tr>
<td>et al. 2014; NCRI, 2014</td>
<td></td>
</tr>
<tr>
<td>Land Claims and Occupancy Studies</td>
<td>4</td>
</tr>
<tr>
<td>Freeman, 1976; Muller-Wille, 1989; Freem</td>
<td></td>
</tr>
<tr>
<td>an, 2011; Qikiqtani Inuit Association, 2</td>
<td></td>
</tr>
<tr>
<td>012</td>
<td></td>
</tr>
<tr>
<td>Education and Outreach</td>
<td>4</td>
</tr>
<tr>
<td>Aporta, 2003, 2009; Larkham and Brake, 2</td>
<td></td>
</tr>
<tr>
<td>011; Eisner et al. 2012</td>
<td></td>
</tr>
<tr>
<td>Understanding Environmental Change</td>
<td>5</td>
</tr>
<tr>
<td>NCRI, 2008; Laidler et al. 2011; Nunavut</td>
<td></td>
</tr>
<tr>
<td>Planning Commission, 2012; Fidel et al.</td>
<td></td>
</tr>
<tr>
<td>2014; NCRI, 2014</td>
<td></td>
</tr>
<tr>
<td>Features Mapped</td>
<td>Publications</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Observations of Climate Change</td>
<td>Fox, 2004; Laidler and Elee, 2008; Laidler and Ikummaq, 2008; Laidler et al. 2008</td>
</tr>
<tr>
<td>Landscape Features</td>
<td>Fox, 2004; Pearce et al. 2011</td>
</tr>
<tr>
<td>Sea Ice Features</td>
<td>Dowsley, 2007; Laidler and Elee, 2008; Laidler and Ikummaq, 2008; Laidler et al. 2008</td>
</tr>
<tr>
<td>Place Names</td>
<td>Ferguson and Messier, 1997; Aporta, 2003, 2004; Gagnon and Berteaux, 2009</td>
</tr>
</tbody>
</table>

Based on findings portrayed in Table 4.4 and Table 4.5, it can be inferred that researchers have tended to use participatory mapping for recording wildlife observations such as migration routes or the location of animals. Examples of this stretch as far back as the ILUOP where Freeman (1976) recorded information on harvest locations, through to more contemporary projects such as Taylor (2005) recording information on muskox, and Kendrick and Manseau (2008) recording information on caribou migration patterns. As Inuit knowledge often ecological in nature (Berkes and Berkes, 2008), the use of participatory mapping when recording Inuit knowledge will often include a strong emphasis on ecological themes. This suggests that the use of participatory mapping can serve as an effective approach towards achieving
environmental management objectives. When paired with earlier evidence suggesting that maps can jog participants’ memory, or allow for further enriched discussion on a subject area (Laidler et al., 2010), it makes sense that maps are perceived as an approach to facilitate interviews that can gather information valuable to achieving project specific goals.

4.4 Uses of Participatory Mapping in the Arctic

4.4.1 Land Claims

First used in the Arctic in the early 1970’s, participatory mapping has since become a prominent tool employed during comprehensive land claims negotiations. Effective land claims require the ability to illustrate long term Indigenous use, occupancy, interest, and habitation (Freeman, 2011; Sparke, 1998; Usher et al., 1992). As land use, occupancy, and interest in land tenure are often geographical in nature, participatory mapping is uniquely suited to record this information.

Used during the ILUOP (Freeman, 1976), the ‘map biography’ approach to participatory mapping has since been adopted by a number of projects from ILUOP to present. It is seen as a straightforward way to demonstrate long term and continued interest in land resources (Usher et al., 1992). The map biography approach seeks to gather information from participants such as where they grew up, where they lived, where they traveled, what species they routinely harvested, where and when these harvesting practices occurred, culturally important sites, and/or burial grounds (Ibid.). This approach was created to support hunters in all Inuit communities of the NWT in
illustrating their lifelong use of the northern landscape. According to Freeman (1976), the value in this was not to record or quantitatively assess perceptions of the land, rather to comprehensively record the extent of land use among all Inuit hunters. Effectively, these map biographies illustrated use, occupancy, and interest over the lifespan of Inuit living in the Arctic, and became the foundation for the Nunavut Agreement (GC and TFN, 1993) and in delineating the new territory of Nunavut.

Similarly, Brice-Bennett (1977) used map biographies to delineate Inuit land use in northern Labrador, acting to demonstrate use, occupancy, and interest on behalf of Nunatsiavummiut (people of Labrador), providing the foundation for the Labrador Inuit Land Claim (Usher et al., 1992). In both of these examples, negotiators were able to use findings gathered through participatory mapping to illustrate the use, occupancy, and interest essential for effective land claims.

Despite the value of participatory mapping challenges have been noted in using this approach to facilitate land claims. Freeman (1976) described the difficulty of using the map biography approach to record perceptions of land use. In order to meet the needs of the study, a standardized criteria for recording information needed to be established that could be applied across all 1600 individual hunters interviewed (Freeman, 1976). Since perceptions of the “usefulness” of the land could differ greatly, as could ideas such as the ‘importance’ and ‘value’ of the land, it was determined to only record the presence and absence of wildlife, camps, trails, and other varied land uses (Freeman, 1976, pp. 47). While this was the case for the map biography approach used by Freeman (1976) and Brice-Bennett (1977), other participatory mapping projects
have sought to record more qualitative information to facilitate land claims. These include demonstrating the extent of knowledge of the land, as well as demonstrating historical continuity of land use (Aporta, 2009). In the case of the Nunavik land claim, one approach saw place names being recorded in order to illustrate the long term knowledge of place by demonstrating historical continuity of Inuit occupation (Muller-Wille, 1989). Described by Engler et al., (2013, pp. 190), “Over a thousand years of occupation by the Inuit is recorded in place names for settlements as well as land, sea, and ice features”. While place names are often thought of as isolated points in a western cartographic sense belonging to one particular feature, place names from an Indigenous perspective can include a number of different features, places, and times. Recording this information with participatory mapping therefore is a far more qualitative process than recording presence or absence; however, it is still useful for demonstrating land use and occupancy.

While studies such as the ILUOP, Labrador Inuit Land Use Study, and the Nunavik Place Names Study all facilitated historic and ongoing land claims agreements, several other studies have recognized the value of participatory mapping for demonstrating Inuit extent of knowledge and use of the Arctic lands and waters. Although these were not directly used in land claims negotiations, these studies are important for dislodging myths that the Arctic is vast and uninhabited, and rather that it is a lived in place. In so doing, land claims are strengthened. In particular, Aporta’s (2003, 2004, and 2009) work documenting traditional trails discussed the value of seeing the Arctic as an extensive network of travel routes, thus illustrating land use. This can be beneficial for continued
claims to increased resource tenure, and for Inuit communities in efforts to document their extent of historical and contemporary use of the circumpolar Arctic (Aporta, 2009).

The use of participatory mapping for facilitating land claims in the Arctic, and indeed across North America (Sparke, 1998), has served to greatly shift the geopolitical landscape of the Arctic environment. Additionally, these studies founded methods that would later be used ubiquitously in participatory mapping projects both across the Arctic, and worldwide over the preceding 40 years.

4.4.2 Environmental Management

The use of participatory mapping for documenting Inuit knowledge in support of environmental management was a prevalent theme among much of the literature, with nearly half of all publications reviewed acknowledging its value. Typically, these publications recorded information such as wildlife habitat or migration routes, sea ice or landscape features, and climatic observations. While all publications inherently supported the notion that participatory mapping was valuable for documenting knowledge, it was also recognized as a valuable tool to record otherwise unavailable information, undertake ground truthing of scientific information; and include local peoples in decision-making processes.

4.4.2.1 Accessibility of Information

One theme discussed in the literature is that participatory mapping is valuable for its ability to gather environmental information otherwise inaccessible through conventional field methods. In remote areas of the north, gathering information on
wildlife habitat, migration patterns, or sensitive areas is often costly and time consuming, leading to information gaps (Berkes and Berkes, 2008). In studies such as that done by Nakashima (1990), participatory mapping was seen as a way to record information on eider duck habitat in the Belcher Islands of Hudson Bay in order to inform decision-making and minimize the impact of oil development. Similarly, Kendrick and Manseau (2008) used participatory mapping in order to record caribou migration patterns and Inuit harvesting areas (Figure 1) around Baker Lake and Arviat, Nunavut. During the NWMB WHS (2004), records of wildlife harvest sites were recorded for a variety of species across much of the Arctic.
In these examples the information recorded would not have been easily accessible through scientific field methods. In the case of Kendrick’s study on caribou migration routes, this would involve using GPS collars, leading to a great expense for researchers and only limited data. Similarly, identifying eider duck habitat is dependent on a variety of factors such as polynyas and wind currents (Nakashima, 1990). As a
result, modelling or gathering this information can be difficult without having direct experience with eider ducks. In the case of the WHS, information on wildlife harvested, or locations of harvest sites would be impossible to attain through other methods other than direct participatory mapping work with Inuit on account of time, expense, and technological gaps that might exist.

4.4.2.2 Ground Truthing

Participatory mapping was also seen as a beneficial tool to confirm other sources of information. In this sense, participatory mapping could act as a way to ‘ground truth’ scientific findings. Described by Nakashima (1990), Inuit hold a wealth of information about the Arctic environment, covering large areas over long timespans. Inuit spend more time over a larger area of their surroundings as opposed to scientific field seasons that might be short temporally, and cover only small geographic areas (Ferguson and Messier, 1998; Berkes et al., 2000). This allows for knowledge to be compared and more detail added to other sources of knowledge available. One example of this ‘ground truthing’ includes work by Kowalchuk and Kuhn (2012), in which Wildlife Harvest Study (WHS) data recorded through participatory mapping were used to assess the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Species at Risk Act. In this instance, existing data was compared with Inuit knowledge as a way to assess species numbers that were used in the COSEWIC assessment. Other circumstances in which participatory mapping was seen as a valuable method for ‘truthing’ information include the Nunavut Wildlife Management Board (NWMB) Baffin Beluga Study (1998), and the Nunavut Bowhead Study (2000). While the Department of Fisheries and Oceans (DFO)
had information on whale populations, due to the vast size of the North, Inuit hunters wanted to share more comprehensive estimates of whale numbers. This both enabled ground truthing of DFO numbers and provided detailed information on whale populations that allowed for improved management decisions. Berkes and Berkes (2008) have described that TEK held by Indigenous peoples often represents great depth in time and scale. Therefore, using Inuit knowledge as an approach to ground truth scientific information could improve the data quality, thus improving its value for environmental management.

4.4.2.3 Local Inclusion

An added benefit of participatory mapping for environmental management expressed in publications was the value of including communities in land management initiatives. As noted in contexts outside of the Arctic (e.g. Aynekulu et al., 2006) the bottom up transmission of knowledge can facilitate the inclusion of local perceptions, values, and considerations into decision-making processes. Inuit often have a detailed understanding of local systems (often more so than external researchers), and are the ones most affected by changes in environmental management regimes. Therefore, it can be greatly beneficial to include Inuit in the decision-making process. In fact, this is the premise behind adaptive co-management, and the creation of more locally inclusive environmental management regimes (Berkes et al., 2007). NWHS (2004) suggested that wildlife harvest information could be used to create management regimes that take into account human needs, or what was coined the Basic Need Level (BNL). This could lead towards decisions that support local people to meet their needs while also maintaining
environmental health. The bottom up transmission of knowledge can allow for local values and goals to be included in decision-making processes (Armitage 2005). In Nunavut, this takes place with Hunters and Trappers Organizations (HTO’s), wildlife management boards, through to the territorial government.

4.4.3 Education and Outreach

While representing only a small number of publications, participatory mapping was perceived to be valuable as a tool for creating educational material for teaching or community outreach, particularly with respect to cultural information. In many instances, these projects focused on place names (Larkham and Brake, 2011), traditional trails (Aporta, 2003), or using GIS atlases for knowledge representation (Eisner et al., 2012). These studies used maps to visualize Inuit knowledge, enabling more context to help represent the depth and value of Inuit knowledge. Figure 2 demonstrates the value of participatory mapping for recording place names. Information represented on the maps was geared to both create teaching material for Inuit, as well as material that could be used by non-Inuit (Eisner et al., 2012). For example, this includes the creation of interactive atlases to document community knowledge (Eisner et al., 2012), or it could take the form of providing communities with CD-ROMs of the recorded data to use as they would like.
Figure 4.2: Map of Igloolik Island, Nunavut, showing the results of participatory mapping to document Inuktitut place names. Source: Aporta (2003, 324). Permission for use obtained by the Arctic Institute of North America

4.4.4 Understanding Environmental Change

Publications listed as planning for environmental change described the use and purpose of recorded information for future land use decision-making and mitigating the impacts of environmental changes. These publications focused on planning for future needs of Inuit, such as evaluating how climate will change will impact harvesting practices (Fidel et al., 2014), or evaluating the extent of marine resource use to plan management regimes (Government of Nunavut, 2014). While many of the publications
listed as environmental management could be said to hold value in planning for future changes, the publications discussed here are explicit in their attempt at using documented information in planning for future climatic changes, changes in wildlife habitat, or changes in human needs.

Publications attempting to plan for climatic changes often discussed how changing weather was becoming increasingly difficult to predict, leading to dangers when travelling on the land, water, or ice (Laidler et al., 2008; Fidel et al., 2014). The use of participatory mapping was seen as valuable for its ability to record information on the state of weather, sea ice, and other climatic features based on past observations of these patterns. Fidel et al., (2014) noted that community-based monitoring that used participatory mapping as a way of recording information was one of the best tools available to fully understand the scale of changes occurring in the North. Similarly, Laidler et al. (2011) assessed the potential to bridge Synthetic Aperture Radar (SAR) imagery with Inuit ecological knowledge of the sea ice in order to better interpret imagery and improve safety of sea ice travel. Similar to environmental management, these studies relied on the depth of local knowledge of climatic systems and observed changes; however, they differed in how that knowledge was being applied.

Alongside recording climatic knowledge such as sea ice features and weather patterns (Fox, 2004; Laidler et al., 2008), participatory mapping was also noted to be of use for understanding wildlife and human use patterns, particularly in the face of rapid environmental change (NWMB, 2008). The Nunavut Coastal Resources Inventory (NCRI) stated one of the objectives of their project was facilitating community planning
processes (NWMB, 2008). Undertaking a comprehensive mapping initiative allowed for an understanding of the scale and extent of marine resource use by Inuit. In so doing, the objective was to create baseline data that would support decision-making surrounding economic development (such as fisheries), creation of parks and protected areas, and ongoing sustainable use by Inuit (Ibid.). Since this project sought to record information spatially, participatory mapping was foundational in gathering and recording Inuit knowledge.

4.4.5 Interview Facilitation

Participatory mapping as an interview facilitation tool was recognized by nearly half of all publications reviewed, and was discussed as being valuable for its ability to allow participants to elaborate on interview discussions. Incorporating mapping into interviews or meetings facilitated more in depth discussions and recording of information than would otherwise be possible through discussion alone. As was mentioned by Fox (2004), once participants oriented themselves on the map, the maps were often useful for illustrating discussion themes and remembering ideas that might otherwise be missed. Additionally, the use of maps allows interview themes to be represented visually which helps to share information more broadly (Laidler and Elee, 2008). Figure 3 depicts maps being used to facilitate conversation between participants and practitioners.
One key theme to emerge from the literature was that participatory mapping allowed for interviews to provide more detailed information when accompanied with mapping sessions. Fox (2004) described how maps enabled a more enriching interview process to occur. In many of the mapping sessions, authors noted how maps were used as a tool by which participants could elaborate on orally discussed themes. In studies of sea ice features (Laidler and Elee 2008; Laidler and Ikummaq 2008; and Laidler et al.,
the use of maps had been described as a way to “enhance explanations of sea ice conditions or use” (Laidler et al., 2008, pp. 54). In a study examining muskox population trends, Taylor (2005) used a similar approach in which participants were asked to use the maps to describe and elaborate on the questions they were asked, such as to illustrate places where they had lived and travelled over their life time. Similarly, participants were encouraged to use the maps to describe locations of encounters with muskox, and if possible, record harvest sites or sites where encounters occurred (Ibid.). This trend was found in a number of other publications in which authors described the use of participatory mapping as an approach to generate more nuanced insights from the interview process (Laidler et al., 2010; Pearce et al., 2011). In this sense, maps were seen as valuable for their ability to facilitate conversation and aid participants in recounting memories as they visualized the places they were familiar with on the map. In essence, maps were part of the interview process, acting as a tool or medium through which more elaborate stories could be shared between interviewee and participants.

Another way maps were described as an interview facilitation tool was for the ability to represent and visualize geographic information being discussed. While the use of maps allows for more elaborate discussion, acting as a medium through which the story is told and jogging the memory of participants (Fox, 2004), it is also important to note that much of the information being discussed is inherently geographical in nature. As such, maps record this information in a way that can transcend cultural and verbal boundaries, allowing for a clear spatial understanding by both the participant and the interviewee. During the Inuit Bowhead Knowledge Study (IBKS), 257 interviews were
conducted and included questions around themes such as locations of whale sightings, and how populations had changed over time (NWMB, 2000). The information recorded was visualized on maps as a way to share and use this information in the future. In similar studies focusing on documentation of wildlife information, the Coral Harbour pilot study and the Nunavut Coastal Resources Inventory (NCRI) final report echoed the sentiment that maps were an essential part of the interview process, and were planned as a way of recording information discussed in the interviews (NWMB, 2014). During that study, maps were chosen in addition to audio documentation as a way to record the information being shared. During a separate study on caribou migration patterns conducted by Ferguson et al. (1998), participants were asked about themes such as animal locations, hunting routes, where they saw tracks, and directions of travel. While this information could be discussed orally and written descriptions could be drafted, the inclusion of maps in the interview process allowed for geographic information to be visualized in a way that made clear the extent of knowledge held by Inuit and their collective experience with caribou. These examples illustrate that while acting as a medium or tool through which the story can be told, maps can similarly act to visualize, bring to life, and share these stories.

In being used as a tool to aid in storytelling, as well as a tool for visualizing stories, participatory mapping appears to be widely accepted as playing a key role in facilitating interviews in Inuit knowledge research. This is not to say that this is the only tool available that can be used to facilitate interviews; rather it is one of many. Examples include Fox (2004) providing pictures, satellite imagery, and paper for
sketches, or the NCRI (NWMB, 2014) providing photos of species. While other tools have been used, maps were advantageous on account of their ability to represent knowledge spatially, and as such were seen as valuable when discussing knowledge that was inherently geographical in nature.

4.4.6 Omission of the Map

One interesting finding from this study was the prevalence of publications that described the use of participatory mapping in their methods sections, but did not include maps as part of their results. In fact, a large number of publications reviewed did not provide maps as a part of reporting on their results. This supports the earlier points around the utility of maps for facilitating discussion or enabling interview topics to be elaborated on. It may also reflect the effort involved in digitizing and compiling mapped information in appropriate and contextual ways, so perhaps authors are choosing to exclude map compilations from results, or perhaps they were only meant as facilitation tools and not for geographic visualizations. Nevertheless, the absence of maps used in depicting research results makes it difficult to assess the role and value of participatory mapping in these cases, since it remains unclear how they were used in certain studies.

4.5 Shifting Goals of Participatory Mapping

When examining the uses of participatory mapping from ILUOP to present, a number of patterns emerge. Firstly, participatory mapping to facilitate land claims was clustered in the 1970’s and 1980’s, however following the signing of land claims agreements there has been a decline in use for this purpose. Secondly, the use of participatory mapping for environmental management and interview facilitation has
seen consistent use from the 1990’s onwards. Finally, outreach and education, and planning for change were both found to occur from 2000 onwards, suggesting more recent use.

Early in the use of participatory mapping in the Arctic, Inuit knowledge was gathered to facilitate ongoing land claims agreements in the NWT, Labrador, and Nunavik. Based on the publications that arose out of use and occupancy mapping, those that gathered data with the express purpose of facilitating land claims agreements all occurred prior to 1990 (Freeman, 1976; Brice-Bennett, 1977; Mulle-Wille, 1989). This can be attributed to pressures faced throughout the 1970’s to increase development across the North, in turn placing pressure on governments to settle outstanding land claims (E.g. Berger, 1977). However, following this period land claim negotiations were well underway across much of the Inuit homelands, and as such documenting land use, occupancy, and interest was occurring less frequently.

Emerging in the 1990’s publications gathering data expressly for facilitating environmental management purposes began to use participatory mapping as a way to include Inuit knowledge in decision-making process, and thus to record local information on land, wildlife, migration patterns, or harvest locations. Beyond this, no other temporal trends seem to emerge, rather participatory mapping has been used relatively consistently over time. Of the studies coded for environmental management, 4 of 17 occurred in the 1990’s, while the rest followed throughout the 2000’s. Similarly, studies recognizing participatory mapping as an essential part of the interview process follow a similar pattern, occurring evenly from the 1990’s onwards. This may arise from
the overlap between studies using participatory mapping for environmental management as well as interview facilitation. Collectively, the strong pattern shown in the use of participatory mapping from 1990 onwards signifies that environmental management and interview facilitation represent the dominant use of participatory mapping over the last two and a half decades. One explanation for this could pertain to the legal requirements in Canada mandating the use of TEK for environmental management and decision-making (Usher, 2000). This has taken the form of provisions enacted through comprehensive land claims agreements, and in mandates developed by the territorial governments, often in the context of co-management. Examples include a provision in the Inuvialuit Final Agreement (1984) mandating the inclusion of Inuit knowledge in decision-making processes, and in a policy drafted by the Government of the NWT in 1993 mandating the integration of TEK into decision-making processes (Usher, 2000).

While legislation mandates the integration of TEK, it does not specify the mechanism for how this is accomplished. This legislation coincides with the rise in participatory mapping for environmental management, suggesting that participatory mapping has served as a mechanism through which to do this. This may also relate to a general shift towards more collaborative research practices (NRI & ITK, 2007; IFAD, 2009). Serving as an approach to include stakeholders more directly in decision-making, participatory mapping can contribute to integrating local opinions and values in research and governance frameworks (IFAD, 2009). This can improve the outcome of the projects, all the while creating a more ethical research process.
Two final temporal trends that are evident among the publications reviewed include the use of participatory mapping for creating educational material, and for planning for environmental change. Both of these objectives, while representing only a small number of the publications overall (4 and 5 respectively), only emerged in the literature from 2000 onwards. This suggests a more recent emphasis in Inuit knowledge research, and may make up a larger segment of publications using participatory mapping in years to come.

One reason in which educational material might have become a greater focus of participatory mapping projects could relate to general critiques of community-based research. Community-based research has been described by Ford et al., (2015) as having a long history of use by outsiders, often justified by ‘beneficial’ outcomes. Their argument builds on critiques put forth by others (Bates, 2007; Sherman and Ford, 2013), where community research may not be representing the best interest of the communities involved, instead serving as a rubberstamp measure. Similarly, Chambers (2006) posed the question of “who gains and who loses” when conducting this form of research (pp. 1). Moreover, how can community-based research practice be designed to truly represent the best interest of the community? The use of participatory mapping in developing education and outreach material may be seen as a partial response to these critiques in efforts to generate more value for communities. Examples of this include Fox (2004) returning CD-ROM’s of data gathered to communities, or Aporta (2003) providing maps of traditional trails.
Chapter 5: Interview Results

As part of understanding the role and value of participatory mapping in an Inuit knowledge research context, it was important to go beyond the literature and to speak with practitioners about their experiences with participatory mapping. This chapter is organized according to the four major themes that were used to guide interview discussions (Section 3.2.2), in order to discuss nuances, insights, and experiences gained through each. Rather than taking the reader through the interviews on a question by question basis, I will outline practitioner experiences with participatory mapping through a thematic analysis.

Throughout this chapter creating consistent language has been a challenge. As ‘practitioners’ interviewed often described interactions with ‘participants’ of mapping projects, it was difficult to differentiate between ‘participants’ in this study (practitioners), and participants in studies that were conducted by practitioners. To maintain clarity, all references to ‘practitioners’ refer to the key informants interviewed for this study, and all references of ‘participants’ refer to practitioner experiences working with Inuit during participatory mapping sessions. Additionally, practitioners will all be cited using an APA format throughout this chapter, i.e. using their last name (or alias depending on confidentiality requests) and year of the interview. Interview references are listed in the bibliography and can be cross-referenced to Appendix 4 for more details.
5.1 Methods

My purpose in discussing methods with practitioners was to identify methods that were employed, perceived challenges, and best practices. Identifying challenges was based on both what practitioners said, and my interpretations of how they were speaking about methods. Most commonly described were methods around recording, storing and visualizing knowledge gathered. This includes how information was gathered, coding schemes employed, software and approaches used for digitization, and final outputs.

5.1.1 Recording Spatial Information

Practitioners gathered information from all participants through in-person interviews or focus groups. While there have been some attempts at using online atlases to record information such as wildlife sightings or migration routes (Eisner et al., 2012), among the practitioners interviewed, in-person interviews seemed to be the preferred approach. On more than one occasion practitioners described this choice as beneficial in promoting relationships with participants. In fact, relationship-building was cited by Carter (2016) and Val (2016) as a key best practice in their work. These two practitioners described how they would usually spend two to three weeks in a community prior to even starting the mapping interviews to foster the development of relationships beforehand. Communities are often unaware of who the researcher is, or why the researcher is in the community. It is therefore up to the researcher to get to know a community first, understand community needs, and ensure that the community
is comfortable with the project (Carter, 2016). Spending time in the community prior to starting the project was a way to address concerns that the community might have. In addition, it provides an opportunity for the community to learn about the project background and gain more context, helping the community to feel more comfortable with why research is being undertaken and how it will be used (Carter, 2016).

When going into Inuit communities, recruitment was considered an important methodological step. Practitioners identified several strategies on how to recruit participants; however, one common practice was to approach multiple local organizations requesting recommendations for candidates that have experience relevant to project goals. There are often a lot of unseen internal politics within communities (Carter, 2016; Val, 2016). To prevent exclusion of any one particular group, asking a number of organizations such as the Hamlet Office, the Hunters and Trappers Organization, or other community organizations, was thought to represent more inclusive outcomes (Carter, 2016; Val, 2016; Aporta, 2016; Regional Inuit Association Employee, 2016). Other strategies to ensure a wide range of participants included making mapping sessions public, or to advertise over the radio (Aporta, 2016; Chenier, 2017).

In addition to selecting interviewees, quality of interviews is also determined by interviewer preparation as interviews can easily be derailed by a lack of functioning equipment. This includes dried out markers, too few maps, or ill functioning computers (Zawadaski, 2017; Chenier, 2017; Kemp, 2017). In fact, velum paper was chosen in lieu of a mylar overlay for the ILUOP because mylar paper would often become brittle when
it froze, causing it to break (Kemp, 2017). Similarly, having enough markers to ensure that all participants have one (Zawadaski, 2017), or ensuring that the right colours are available for designated coding schemes (Val, 2016) can greatly improve the interview process.

5.1.2 Features Being Mapped

Broadly speaking, features being mapped by participants can be broken down into two main categories: ecological and cultural. Ecological information often took the form of documenting biotic and abiotic features in the environment, whereas cultural information recorded features such as land use, travel routes, historical land use, or areas of importance such as burial sites or traditional camp sites. While many practitioners were looking to document either ecological information or cultural information, it was rare that either of these would be recorded in isolation from the other. When looking to record ecological information such as critical habitats, sea ice features, or wildlife sightings, details of land use such as hunting and fishing, or descriptions of the cultural value of key locations, were recorded (Ljubicic, 2016; Breton-Honeyman, 2016; Regional Inuit Association Employee, 2016). Alternatively, when looking to record cultural information such as camp sites, place names or trails, additional information such as the locations of different species and ideal habitat were discussed as well (Aporta, 2016). While this serves as a reflection of the holistic nature of Inuit culture and land use practices, it is important methodologically because it illustrates the difficulties of breaking down Inuit knowledge into constituent elements. One practitioner discussed one of the biggest challenges in recording Inuit knowledge
being the maintenance of the holistic nature of this knowledge, or moreover, the context of the knowledge (Hayes, 2016). These contextual elements include both ecological and cultural information. Isolating one from the other can alter the quality of information and generate ethical concerns with how information is being represented and/or interpreted. If an interview between a practitioner and participant is exploring, for example, char populations at a particular site, it may not be representative of sites elsewhere (Hayes, 2016). Recording contextual elements such as this can prevent information being used in a way otherwise not intended. A best practice was to record all features that provide relevant context to the information being provided, whether ecological or cultural. Strategies included maintaining detailed notes throughout the interview sessions (Ljubicic, 2016), and recording contextual information such as who was interviewed, how the questions were asked, links to audio files, and any other information that might help maintain the context of the knowledge shared (Hayes, 2016).

5.1.3 Hard Copy vs. Digital Mapping Tools

Perhaps one of the most consistent themes identified throughout this project pertains to the approaches of gathering and recording information. Use of a hard copy base map with coloured markers was the preferred approach for gathering information among nearly all practitioners. Of the 15 practitioners interviewed, 13 described the use of the hard copy method with only 2 discussing digital technologies for recording information. When asked about strengths or weaknesses of different methodological approaches, one practitioner described the use of hard copy maps as a much more
“genuine” approach to recording information (Val, 2016). In particular, this practitioner was praising the ability of hard copy maps for building relationships and generating conversational flow.

In contrast, 2 of 15 practitioners interviewed described the use of a digital approach to recording Inuit knowledge, and discussed potential advantages over hard copy maps. A Regional Inuit Association Employee (2017) indicated that the switch to using a predominantly digital approach was said to have streamlined the process, making it faster and easier to control quality, and reducing the risk of digitizing errors. This approach used an ESRI online platform to record participant information and make it available in policy and decision-making. The other practitioner with experience using digital technology was not as involved in the information gathering process, however was deeply involved in data management post-recording. In particular, this practitioner had used online atlases for visualizing and sharing Inuit knowledge (Hayes, 2016). While Inuit knowledge could be recorded in a number of ways, advantages of using digital technologies such as an atlas to visualize information allowed for a much more advanced coding system or legend to be employed, recording more features, and maintaining more of the context of information recorded through links to text, photos, or audio (Hayes, 2016).

Based on the experiences of practitioners, positives and negatives were described for both hard copy and digital approaches of recording Inuit knowledge. While many practitioners described the comfort level participants seemed to have with hard copy maps (Carter, 2016; Val, 2016), the use of digital technologies was seen to have
advantages in post-interview processing of information (digitization), and in quality control of features mapped (Regional Inuit Association Employee, 2017). Additionally, digital technologies have the ability to record and georeference information in a variety of other media. An example of this would be to georeference audio clips based on what the participant was talking about while they were drawing out a particular feature (Hayes, 2016). This retains much of the context of the interview, a major consideration when trying to apply findings towards project objectives. As such, while hard copy maps are “tried and true”, digital technologies offer significant opportunity in the future (Griebel, 2016).

5.1.4 Scale

The scale of base maps employed among practitioners was variable. Of those that could remember the scale of maps they had used, 5 described using 1:250 000 maps, making it the most common. Other scales included 1:50 000, 1:500 000, as well as custom prints that were at smaller scales to represent regional areas. One interesting theme raised in a number of interviews was that the scale selected was never perfect for conducting interviews (Ljubicic, 2016; Carter, 2016; Fraser, 2017; Chenier, 2017). Ljubicic (2016) described how no matter how large or small the scale is there was always someone who wanted more detail, or who wanted to draw a feature not represented on the map. In order to address the challenge of covering a larger area, a number of practitioners discussed the taping of a number of base maps together (Ljubicic, 2016; Fraser, 2017), or simply creating much larger regional maps to use during the interviews (Aporta, 2016). Interestingly, while several practitioners discussed the need for larger
scale maps to add detail, there seemed to be fewer strategies to address this. In 2 of the 15 interviews, practitioners briefly mentioned the use of digital technology, including a zoom function, as a way to address this (Breton-Honeyman, 2016; Hayes, 2016). In both these interviews participants suggested that this may be a way to address the challenge of multiple scales. One critique of this, however, was that in the Arctic there are often issues with bandwidth availability which prevents the use of online mapping tools. Additionally, a number of practitioners discussed the comfort level Inuit have with paper maps, and felt that there was a lower level of comfort with digital technologies (Val, 2016; Kemp, 2017).

As a strategy to overcome barriers related to scale, practitioners described a variety of approaches. One suggestion was to choose a scale that best allows features of interest to be recorded, while also representing the geographic area of interest. In her work with Inuit to determine the size of Nunavut park boundaries, Etheridge (2017) described only using 1:50 000 maps due to the small size of the parks being developed. This was perceived to allow participants to be precise in delineating areas they felt should be protected on the scale of a small park. Alternatively, in his work mapping trails across Nunavut, Aporta (2016) described the printing of custom 10ft by 10ft satellite images for participants to use. In both these circumstances, features being mapped were relatively specific, and the scales chosen allowed for the best outcome. In circumstances in which multiple features were being mapped, this strategy might not be as effective. In these instances a best practice discussed included contacting the
communities in advance to discuss which scale worked best for the region they wanted to cover (Carter, 2016).

5.1.5 Coding Schemes

Two key methodological considerations of interest to this research are how coding schemes or legends were employed by practitioners of participatory mapping, and what types of coding schemes work best for recording different types of information.

One consideration when implementing a coding scheme pertains to the features that are being mapped. Of the projects discussed, features varied greatly from mapping only a few cultural features such as place names and trails (Aporta, 2016) to land use and occupancy projects that mapped as many ecological and cultural features as possible (Val, 2016; Kemp, 2017; Fraser, 2017). As such, coding schemes were greatly variable. Describing her work in Nunavik, Breton-Honeyman (2016) explained the use of an alphabetical coding system for projects with multiple features being mapped, with one letter to indicate season, and another to indicate feature. An example of this would be ‘SPB’ to indicate Spring Polar Bear. This was seen as a useful coding system due to the simplicity of recording information; however, it was acknowledged that this system might not be appropriate for recording large volumes of information, or recording information in a way that allows for easy processing of data post-interview. When recording a large number of features such as place names, Aporta (2016) described a numerical coding system in which each value corresponded to a different location. This
was advantageous because features were easily identifiable once familiar with the codes. However, challenges did exist as this approach was considered time consuming to undertake (Aporta, 2016).

Another approach to code information was to use a colour-based coding scheme, with different colours representing different types of features. Examples of this include the work of Aporta (2016) mapping trails and Breton-Honeyman (2016) mapping areas of interest for Beluga. Strengths of this system included the straightforward nature, particularly when recording only a few specific features. As a more advanced version of the colour coding scheme, a number of land use and occupancy projects described the use of strict legends that used different colours and line types to represent different features and activities (Val, 2016; Fraser, 2017; Kemp, 2017). In these instances, strict legends were perceived as necessary for their ability to record a variety of different types of features in a clear way (Fraser, 2017; Kemp, 2017).

Finally, one last coding scheme discussed was the use of an ‘open coding scheme’, where participants were afforded the freedom to draw features in a way that best represented the information they wished to share (Ljubicic, 2016; Chenier, 2017; Zawadaski, 2017). Practitioners that discussed this approach saw value in allowing participants to have a bit more flexibility, enabling a more conversational flow in the interviews. This facilitated the interviews and allowed participants the opportunity to lead decisions around what information to share, and to discuss in more depth. However, in such cases practitioners also encountered challenges, particularly when features tended to be drawn differently by different participants, which caused issues in
some cases with ensuring accurate digitizing post-interview. An example of this might be recording one feature type, for example a caribou range, as a polygon while others would draw the range using lines. This poses a challenge in digitizing and representing Inuit knowledge visually, as information can be more easily missed, or misrepresented.

One final consideration when selecting a coding scheme is the end goal of mapping product. Recording information with the intention of producing maps, or illustrating select themes favoured simpler coding schemes, whereas recording larger volumes of data to be used for a variety of objectives favoured more complex coding schemes. In the case of gathering data for delineating park boundaries, Etheridge (2017) used a colour coding scheme to mark out biotic, abiotic, and cultural areas on a map. Similar examples include Aporta (2016) using a simple colour scheme for recording seasonal trails, or Breton-Honeyman (2016) using colour coding scheme for recording information on beluga. In these circumstances, practitioners were looking to record select themes, and as such chose simpler coding schemes. In contrast, where project objectives were more varied or the volume of data was greater, more complex coding schemes capable of recording more information seemed to be the preferred option. Examples include the ILUOP (1976) where a detailed coding scheme was used to record as much detail as possible. This included a variety of colours, line types, and features. According to Kemp (2017), this was on account of uncertainty in the questions that would arise during land claims negotiations, thus requiring as much knowledge as possible to be recorded.
Ultimately, coding schemes employed were chosen on a project by project basis to meet the project objectives, to meet the needs of individuals involved, and to correctly identify features being mapped. When a project was looking to document a large number of features numerical or alphabetical coding seemed to fit best, however when smaller more detailed number of features were being recorded a more simple colour coding scheme seemed to be preferred. In circumstances in which the maps were being used largely as a tool for interview facilitation, it seemed that a more open coding scheme was preferred to facilitate discussion.

One challenge pertaining to different coding schemes relates to how contextual information is linked to information drawn on maps, such as who was interviewed, what community, date of interview, locations being discussed, activities being undertaken when describing particular features, etc. In his work with a variety of data collected using classic hand-coded paper process, Hayes (2016) described how much of this contextual information is not recorded, leaving gaps in the data. Additionally, challenges were described surrounding community research burnout. Therefore, developing coding schemes that record more information about each interview may help keep track of what has been done – and with who – and thus to reduce duplication that can lead to burnout (Hayes, 2016; Griebel, 2016).

5.1.6 Analysis: Data Processing and Interpretation

Learning about the analytical practices used by practitioners following their interviews was also of interest to this study. In particular, what approaches were used
to process knowledge recorded, how knowledge was interpreted, and what challenges were perceived in both processing and interpretation of Inuit knowledge.

Overall, practitioners described avoiding extensive processing of knowledge recorded; opting for minimal processing aimed to improve clarity of the information being portrayed. For example, when creating the summary maps found in Volume 3 of the ILUOP, Kemp (2017) described processing data using a program designed to limit overlap of information, thus improving map clarity. In this circumstance, data processing was not a process of manipulating the data in order to gain new insights, but rather smoothing overlapping lines. Similarly, other practitioners described minimal processing techniques for data, including thematically organizing information recorded (Aporta, 2016), or simply portraying all information discussed by participants (Zawadski, 2017).

One reason for the minimal analysis practices could pertain to a general concern with manipulating or changing data, and the associated potential of using data in a way they were not intended for. Ljubicic (2016) stated that there is always the concern that you will change the meaning of the data or remove the data from context. There were times when she thought she could do more to explore ways of visualizing the information, or using it to generate new insights, however held back out of concern for misrepresentation. As keeping the data in context was a concern that was brought forward by a number of practitioners (Griebel, 2016; Hayes, 2016; Ljubicic, 2016; Regional Inuit Association Employee, 2017), this is an important consideration when undertaking analysis.
While minimized processing was generally favoured, some practitioners discussed more involved processing techniques. After gathering data on belugas through participatory mapping, Breton-Honeyman (2016) described a kernel density method to identify hotspots of beluga activity. To address concerns surrounding changing the meaning of data, Breton-Honeyman (2016) ensured that participants were aware from the outset as to how the information was going to be analyzed and eventually represented. In this way, analysis could occur in a way that maintained the original context as participants understood the processing that would be undertaken afterwards.

Analysis also involved the interpretation of recorded data. As with data processing, practitioners often discussed the need to keep participants involved in the interpretation process. Regional Inuit Association Employee (2017) used an analogy to illustrate this: “if you were to ask a doctor to do a biopsy on your body for whatever reason, a specialist won’t just give you the results to interpret yourself, they would interpret it for you because it is something outside of your knowledge. So you would hope to do the same thing with participatory mapping... how would the person collecting it understand the context of it?” Keeping participants involved in the whole process of participatory mapping, including the interpretation, is the best way to ensure that information is kept in context, and to avoid inadvertently representing data in a way unintended by participants. Examples provided by practitioners included maintaining transparency with participants from the outset of the project (Aporta, 2016; Breton-Honeyman, 2016; Regional Inuit Association Employee, 2017), including
participants in the project design (Carter, 2016; Zawadski, 2017), and including participants in the interpretation of data gathered (Carter, 2016; Regional Inuit Association Employee, 2017).

5.1.7 Methods Summary

When discussing best practices among practitioners, one reoccurring trend was lack of a one size fits all approach, rather methods should be designed around individual project objectives. While there are countless best practices that could be described, ultimately it is important to ensure that projects are designed around the specific tasks they are attempting to achieve. One practitioner stated “maps for the sake of maps are useless unless they do something” (Regional Inuit Association Employee, 2017). Projects that have been most successful at “doing something” are those that have designed their overarching methodological approach in order to achieve a particular objective.

5.2 Representing Inuit Knowledge

Understanding how representative maps are of the stories people are trying to share is key in understanding the role and value of participatory mapping in an Inuit knowledge research context. Carter (2016) stated “nothing gets people talking like sitting around a map”. Maps are essentially a platform for telling stories; however, little discussion has centered on how representative maps are of the information people are looking to share. Griebel (2013) stated that maps are “a more accurate image of the psyche than reality” (pp. 20), indicating that maps reflect how we see the world rather than reality itself. In participatory mapping, it is relevant to question whose perception
of the world is being represented. Throughout the interviews I inquired about the
degree to which practitioners felt participatory mapping represented the stories that
were being shared by Inuit, and whose perspectives the maps were representing. While
there were no clear answers with respect to the degree to which maps represented Inuit
knowledge, insights were gleaned from practitioner experiences. In particular,
practitioners described how maps represented Inuit knowledge in a way that allowed
project objectives to be met. Maps were also seen as representing Inuit knowledge in a
way that allowed for certain stories to visualized, and the power that maps hold in
facilitating knowledge exchange. Collectively, this speaks to whose story is being told,
the value of research and participatory mapping in the Arctic, and considerations
moving forward.

5.2.1 Meeting Project Objectives

When asked whether they felt maps were representative of Inuit knowledge
shared, 8 of the 15 practitioners described the effectiveness of maps for communicating
knowledge pertinent to project objectives (Aporta, 2016; Northern Organization
Employee, 2016; Val, 2016; Etheridge, 2017; Fraser, 2017; Kemp, 2017; Regional Inuit
Association Employee, 2017; Zawadski, 2017). This is not to say that maps were
representative of the full story being shared by Inuit, rather that they were
representative of the knowledge required to meet the objectives of the project.
Northern Organization Employee (2016) stated that he felt they were generally effective
at engaging communities and recording information during community research. In
another instance Zawadski (2017) described the use of maps to voice community
opposition toward a proposed mine, and how they were effective at illustrating how the community would be impacted by mining development. In these instances, practitioners described how maps were effective at sharing knowledge, or representing that knowledge in a way that allowed for project goals to be met.

Interestingly, during interviews practitioners often avoided directly responding to how representative maps are of Inuit knowledge, instead describing necessary factors to ensure maps were as representative as possible (Breton-Honeyman, 2016; Regional Inuit Association Employee, 2017). Through discussion the notion arose that the maps represent the stories of the projects themselves. Whether maps were looking to map boundaries for parks (Etheridge, 2017), provide communities with data to leverage against natural resource development companies (Fraser, 2017), or illustrate how communities will be impacted by proposed development (Carter, 2016; Zawadski, 2017), maps were seen as representative of the stories the projects were looking to tell. Val (2016) described maps he had made during the ILUOP and how they told a story of Inuit land use and occupancy of the Arctic. Maps created by Etheridge (2017) told the story of Inuit environmental knowledge as seen within the parks system, and demonstrated areas in need of protection. In both these examples, the story being told might not fully represent Inuit knowledge, rather Inuit knowledge in a specific context to achieve a specific goal. In this sense, maps might reflect realities of those involved with the project’s design and development, rather than Inuit themselves. As maps have long been rooted in colonial processes, acting as mediums for power to be exerted (Harley, 1988; Harris, 2004), the power dynamic present in research projects must be considered.
carefully. The following section will examine how maps serve to represent Inuit knowledge.

5.2.2 Considerations When Representing Knowledge

In addition to discussing the ability of participatory mapping to represent information necessary for project objectives to be met, many practitioners also discussed considerations needed to make maps more representative of Inuit knowledge being shared. Three main considerations emerged from this: 1) the impact of technologies used to record the story being told, and how this shaped how it was represented; 2) the impact the researcher’s analysis has on the story being told; and 3) whose story is being told and how it is represented.

Hayes (2016) noted that recording technologies used during participatory mapping can have a large impact on how representative maps are of the story being shared by Inuit. He noted that western cartographic conventions make recording Indigenous knowledge inherently difficult. One example provided was how a feature is named. In western cartographic convention, features such as rivers, mountains, and lakes will all have their own name, and these are often represented by a point, line, or polygon. In contrast, an Indigenous worldview might have a section of river, side of the mountain, and a shoreline of a lake not just sharing the same name, but being a single named entity. The same place might also have different names to different peoples, different attributes to be collected, names based on time of year, and other ways of thinking about place that were not envisioned by classic GIS developers. Overall, the
challenge is representing Indigenous knowledge in a way that retains that intent and context of the knowledge shared — either by adapting western methodologies or co-developing new ones with Inuit. This is a necessary consideration when trying to represent Inuit knowledge.

In addition to technologies used, Hayes (2016) described considerations necessary during the process of recording information, in particular with how information is digitized. When information is recorded with paper copy maps and coloured pencils or markers, it is often not as precise as the digital technologies responsible to digitize those features. As such, there is a concern that artificial accuracy and precision might be afforded to that information (Hayes, 2016). Whereas a participant might be referring to a general area that is inhabited by an animal species, when the area is digitized it might take the form of a precise line. In order to avoid changing the meaning, it is therefore necessary that the context of this information is maintained along with the geographic feature. To Hayes (2016), the more context mapping technologies can retain, the more representative they are of the Inuit knowledge being recorded. This context includes how the question was asked, what the participant was describing, who the participant was, or what the purpose of the project was (to name a few). By including this information, the maps were seen not as more accurate, but as better capable of making the reader aware of the type of information represented.

Another consideration that arose throughout interviews pertains to who is interpreting Inuit stories and knowledge. If the researcher is unfamiliar with the context
of a story being told information is often prone to being omitted (Hayes, 2016). This was a common theme that emerged from the interviews: the effectiveness of maps at representing participant stories was considered a reflection of the researcher’s understanding of the story context (Carter, 2016; Hayes, 2016; Val, 2016; Chenier, 2017; Zawadski; 2017). Chenier (2017) asked: how can the researcher record the context of knowledge shared if they do not understand the context? Therefore, to improve how maps represent Inuit knowledge it is necessary to promote collaborative research whereby participants not only share knowledge, but they are engaged in its interpretation. This was supported by several practitioners. Zawadski (2017) described how being Inuk raised in Nunavut provided an advantage in that it allowed her to understand participant perspectives more clearly than may have otherwise been achieved. She felt that this understanding limited misinterpretations that could otherwise occur. Similarly, Carter (2016) and Val (2016) discussed how the depth of knowledge represented was much greater when interpreters and community members were participating actively in the research process, particularly in the interpretation of findings. In this sense, the more the communities and participants were involved in telling and interpreting stories and knowledge gathered, the more representative the maps were perceived to be.

While a large focus of representation has centered on how Inuit knowledge was documented, interpreted, and shared, some practitioners also discussed the importance of considering whose knowledge is being shared, and how this is represented in the maps. Discussed by a number of practitioners, information represented on maps often
does not indicate whose story is being told, or whose information is being recorded (Carter, 2016; Griebel, 2016; Hayes, 2016). The viewer of the map is often unaware of whose information is being represented, how many people were involved in recording their knowledge, or whether or not the individuals involved had the most experience relevant to project objectives. According to Carter (2016), there is often not enough time or resources in research projects to interview everybody. As such, maps depicting community knowledge might not be depicting all of the community’s knowledge, rather a select portion. It is not uncommon for Inuit to travel, or live in different places throughout their lives. Therefore, if you are recording information on a particular area, it is possible that the people who know that area best might no longer live there. As research timelines are often finite, it is not always possible to speak with the most ideal candidates (Hayes, 2016).

Another consideration cited by Griebel (2016) pertains to the feature types being recorded. Griebel described how in Inuit knowledge research there is an increasing number of research is relying on a shrinking population of elderly knowledge holders. Trying to depict a theme such as traditional land use may leave out the land use practices of a large segment of a community (e.g. younger active hunters, families travelling on the land seasonally, etc.). In this sense, maps often represent an idealized version of reality. Therefore, the challenge faced in trying to accurately represent these stories relates to maintain contextual elements that allow for the whole narrative of the story to be conveyed, such as whose story is being told, the temporal span of knowledge being shared, and how is it represented.
While critiques exist, particularly when describing omissions of context regarding whose story is being told (Griebel, 2016; Hayes, 2016), participatory mapping continues to offer an important methodological approach for exchanging knowledge. When asked about the representative nature of participatory mapping, Kemp (2017) responded “what is the alternative?” Challenges exist in maintaining the context and visualizing gaps in information; however, maps are perhaps one of the only approaches to accurately visualize place-based knowledge that is geographical in nature.

5.3 Applications of Participatory Mapping

During the interviews practitioners described participatory mapping for Inuit knowledge research in two predominant ways: 1) generating conversation and enriching discussion; and, 2) to record either ecological or cultural information to later be applied to decision making. The following section describes how participatory mapping is used, and how mapping products can later be applied to meet project objectives.

5.3.1 Participatory Mapping for Interview Facilitation

One theme that emerged from a number of interviews was that the value of maps extended beyond their ability to record and visualize information to include the process of recording information. Ljubicic (2016) described how participants would often see maps laid out on the table and start pointing and telling stories before the project was even described. Therefore, maps were seen as an effective means of encouraging conversation with – and between – participants. Similarly, Val (2016) described how during the ILUOP interviews they would start with generic questions to
get a conversation going. Val (2016) stated that “it’s amazing how this one simple question could lead to a 50 minute conversation”. While recording features was the goal in the use of maps in these examples, the maps were also valuable in that they provided a medium through which to have a conversation around the cultural value of place. This theme was elaborated on by Hayes (2016), who described how maps were valuable to not only visualize Inuit knowledge, but to engage community members in important discussions. Similar sentiments were shared by Aporta (2016), Chenier (2017) and Zawadski (2017), who described the value of using participatory mapping not for what it could record, rather for their ability to support community engagement. Reasons cited included the public nature of mapping sessions allowing for community members to come together and discuss issues of importance (Chenier, 2017; Fraser, 2017), or improved participation in consultation processes (Etherridge, 2017; Zawadski, 2017). In these examples, the process of participatory mapping to facilitate knowledge sharing was equally as valuable as it was to record knowledge.

5.3.2 Participatory Mapping for Recording Features

Similar to the use of participatory mapping for facilitating knowledge exchange and documentation, many practitioners described participatory mapping as valuable to record features, often with maps have various applications following the completion of the project. The following discussion lists applications of information recorded with participatory mapping, including: facilitation of land claims, facilitate environmental planning and decision-making, and to help share and publicize cultural knowledge study results.
Discussed throughout Chapter 4 and in section 5.1.2, the use of participatory mapping for recording features to be applied towards land use and occupancy studies is well documented. During the interviews this application was also described by several practitioners. Kemp (2017) described how participatory mapping is ideal for recording features illustrating use and occupancy of an area, an essential element during land claims. When participating in the ILUOP, Val (2016) and Kemp (2017) described how the main objective was to record a combination of cultural and environmental features in order to arm Inuit at the land claims negotiating table, answering legal questions about occupancy that were being asked. This was not just recording information on where the caribou or char were, rather it was recording Inuit use of these species, and Inuit use and knowledge of the land (Kemp, 2017). Kemp (2017) stated that they were recording the “nuts and bolts of traditional knowledge”, in an effort to get at the heart of what occupancy meant. These maps provided the foundation for the land claims negotiations, and according to Val (2016) “they were fundamental to the government accepting the Inuit land claim. It led to 20 years of negotiations so that in 1993 there was a Nunavut land claim.”

Another prominent feature type being recorded with participatory mapping was environmental and land use features to be applied towards environmental planning and decision-making. Carter (2016) described how during her research she was looking to record information on sea ice use with the idea of applying maps towards shipping route identification. Also recording environmental land use information, Regional Inuit Association Employee (2017) stated that participatory mapping was the recognized
institutional process for undertaking consultations to apply local knowledge towards decision making. Similarly, Etheridge (2017), who works for Nunavut Parks, stated that participatory mapping was ideal to facilitate decision-making on the delineation of park boundaries. In all these circumstances, participatory mapping was recorded environmental or land use features in order to be applied towards larger project objectives.

One final application of participatory mapping described by a number of practitioners was towards the creation education and outreach material for communities (Aporta, 2016; Hayes, 2016; Griebel, 2016; Ljubicic, 2016). Maps created formed the foundation of academic publications, or educational material such as the Siku Atlas, with the ultimate goal to integrate this information into school curriculum (Aporta, 2016; Ljubicic, 2016). Additionally, two other practitioners described the creation of atlases of community knowledge (Hayes, 2016; Griebel, 2016). Interestingly, these atlases were not designed as a way to preserve local cultural information, rather they were designed as a way to give access to the information provided by community members (Griebel, 2016). According to Griebel (2016), communities are burned out with researchers always asking for the same information. The creation of atlases is designed to not only visualize community knowledge, but to give communities access and control over their own knowledge.

While providing communities with mapping products was considered a way to give back to the communities, one critique that emerged was that these kinds of products are often not used in communities (Griebel, 2016; Zawadski, 2017). Griebel
(2016) described that most researchers are missing the point when it comes to these projects, communities do not want to have these products made for them, they want to be the owners. Griebel further went on to state: “Communities will go a long way to back something they feel is Inuit [created]... and these projects are not perceived as Inuit [created].” Overall, this illustrates the importance of Inuit being involved in the whole process of participatory mapping, not just in the mapping sessions and analysis but in deciding upon the design and eventual applications as well. Additionally, it is important for mapping projects to have clear goals from the outset. A Regional Inuit Association Employee (2017) stated that maps need to do something to be useful. Going into the communities and designing research projects around community needs could serve as a way to create a clear and concise objective, making the final product more applicable to communities.

5.3.3 Barriers and Opportunities to Application

One interesting theme to emerge out of the interviews pertains to a gap that exists in the application of information gathered through participatory mapping in that a number of practitioners described how one of the major objectives of their project was to eventually influence policy or support decision-making (Breton-Honeyman, 2016; Ljubicic, 2016). However, this was discussed as a challenge for a number of reasons. One reason described by Breton-Honeyman (2016) pertains to a gap that exists between map makers and policy makers. She stated that policy makers are often not involved in the mapping process and those who are mapping are not involved in the policy development. When asked if there were any strategies to address this, Breton-
Honeyman (2016) responded, “I’ve had to become a policy maker in the meantime”.

This strategy is one that has been echoed in the methodological best practices described earlier in the chapter; in other words, design your methodology around the needs of the project objectives in order to facilitate applications. ILUOP is a good example of where methods were developed to meet legal needs as specified by lawyers (Kemp, 2017). As such, there is an opportunity that exists to align methodologies for participatory mapping with the needs of policy makers.

Another challenge in using information gathered for policy pertains to the ethics of sharing information. Ljubicic (2016) described how it was their intention to share information gathered with organizations that develop policy; however, they were also concerned with the ethical implications of that knowledge being used in ways outside the original project context. While ethics of data sharing will be described further in later sections, some of the main ways to address ethical issues pertain to the transparency of how the information is going to be used (Regional Inuit Association Employee, 2017). If in these instances researchers planned from the outset to use their data to shape policy, it could be integrated into the consent protocol and project methods, allowing for some of these ethical issues to be avoided. According to a Regional Inuit Association Employee (2017) increased data sharing amongst different research groups would only be a positive for policy development. While this cannot always be planned from the outset, if coordinated pathways could be developed through which to share information, significant opportunities exist in the application of data towards shaping policy and development.
A common theme across several interviews was the need to keep participants involved in deciding upon the applications of mapping projects (Carter, 2016; Griebel, 2016; Breton-Honeyman, 2016; Northern Researcher, 2016; Regional Inuit Association Employee, 2017). Carter (2016) and Breton-Honeyman (2016) both described how Inuit who contributed in mapping sessions saw the value in the information being gathered and wanted to be involved in how it was used. In the projects undertaken by both these practitioners, Inuit wanted to use the data to inform local decision-making, as well as to advocate for greater local involvement in regional decision-making processes. Keeping participants involved in determining applications was seen to enable more representative information to be gathered, and for the information to be more useful in the end.

5.4 Ethics

The final theme explored through interviews was the ethical considerations when using maps for Inuit knowledge research. Maps have a long history in colonial processes and in reinforcing unequal power relations (Harley, 1988). Therefore, there are many important considerations in how information is recorded, represented, and visualized through participatory mapping. The following section describes practitioner experiences with ethical concerns that have arisen, as well as approaches they have used to address or avoid ethical concerns within their research.
5.4.1 Ethical Considerations and Strategies

One ethical implication that emerged pertains to how Inuit knowledge is represented and interpreted. Ljubicic (2016) described how there have been times when participants have been hesitant to draw on the map for fear of limiting that information to the points or lines depicted on the maps. In this case, there was both the fear that information represented on the maps would be interpreted and used in a way not originally intended, as well as a fear that those points would be interpreted as ‘fact’, when they were meant to only provide an indication of the knowledge of that participant. Another consideration described pertains to the nature of researchers gathering knowledge and ‘taking it back to the lab to analyze’ (Hayes, 2016). Hayes (2016) stated “…this idea of collecting info and taking it away and doing stuff with it and having the community only have their say at the beginning and...have to live with the results, that is a serious ethical concern of participatory mapping.” Hayes went on to explain a story of how an Indigenous Chief described to a surveyor what land the band used. The chief described how the people used the land from the mouth of a bay as far inland as you could hear a gunshot (Hayes, 2016). Somehow this managed to be turned into a polygon representing that First Nation’s territory. In this case, there was a qualitative assessment of Indigenous knowledge that led to a negative impact for that band. One strategy to address this described by Carter (2016) was through upholding the “spirit of the ethics [agreement].” While consent forms might allow for certain uses of knowledge gathered, this researcher described how it was essential to use knowledge only within the initial context of why data were collected. Carter stressed the
importance of keeping participants involved in every stage of the mapping project in order to ensure they felt comfortable with how the project was progressing, and how their knowledge was to be used.

In addition to how knowledge is represented, there is also the concern of how to represent information not shown, or moreover, areas that may look as though they are ‘blank’ or ‘empty’ (Hayes, 2016). One example of this might be producing a map of Inuit knowledge on caribou. The map might depict caribou only in a few locations; however, this does not mean those are the only locations of caribou rather that those are the locations where Inuit involved have shared their knowledge of caribou. How ‘blank space’ is represented was described as an ethical concern by a number of practitioners (Carter, 2016; Hayes, 2016; Ljubicic, 2016; Etheridge, 2017). As such, practitioners described the need to keep Inuit involved in the analysis and representation of information in order to ensure that contextual elements were maintained (Carter, 2016; Hayes, 2016; Regional Inuit Association Employee, 2017).

One consideration shared by 13 of the 15 practitioners related to a concern among participants with how information they provided would be used. For example, Carter (2016) and Breton-Honeyman (2016) described how they had experiences where participants were concerned with how information was going to be used, and why they were looking to document that information. One strategy to address this was to ensure that project objectives were clear at the beginning of the interviews (Aporta, 2016; Carter, 2016; Etheridge, 2017; Regional Inuit Association Employee; 2017). This often took the form of detailed informed consent forms, spending time in the communities...
prior to conducting research to develop personal relationships (Carter, 2016; Val, 2016), and discussing project goals and objectives with participants rather than simply asking for signed consent forms (Regional Inuit Association Employee, 2017).

One final ethical concern that arose throughout the interviews related to control and ownership of knowledge gathered. Hayes (2016) discussed how despite ethics protocols and informed consent, in some instances communities are essentially losing control over their knowledge. The reality is that once Inuit knowledge is represented on maps, it ends up in multiple hands and it spreads (Val, 2016). While sharing of knowledge can have benefits for applications such as policy development (Regional Inuit Association Employee, 2017) the loss of control over how that knowledge is used has ethical implications. Stated as a strategy to empower communities by 3 of 15 practitioners, it is necessary to provide access to the knowledge recorded for participants involved (Griebel, 2016; Hayes, 2016; Regional Inuit Association Employee, 2017), enabling communities to control decisions around who gets to use their knowledge, and how it is used. This does not just involve giving maps back to communities, rather providing communities with all forms of original recordings (e.g. interview audio, video, photos, transcripts, maps). According to Griebel (2016), much of the knowledge gathered when conducting ‘community research’ does not find its way back to communities. This is not only an ethical concern, it also impacts the willingness of communities to actively participate in future studies. As such, providing original materials and compiled results back to communities was seen as a necessity. While technological capacity to maintain and use knowledge stored in a GIS might be a barrier
to this, Hayes (2016) and Griebel (2016) described how this can be overcome with data management agreements between communities and third party organizations. Advantages of this approach was that Inuit communities would be in possession or control of all knowledge gathered. This would allow them to dictate how information is represented, used, disseminated, and preserved even if it is not housed locally (Hayes, 2016).

5.5 Chapter Summary

Reviewing methods employed and learning from collective practitioner experiences provided insights into the role and value of participatory mapping. While practices differed greatly, a common emphasis was that participatory mapping methods needed to be developed around specific project goals, and on a project by project basis. Additionally, a number of practitioners stressed the importance of the inclusion of community organizations and knowledge holders when designing methods.

When looking at the representative nature of maps, the collective experience showed that maps were perceived as representative in different ways. Collectively however, all practitioners saw maps as a valuable way to record participant knowledge, and an approach that allowed for more information to be gathered than would otherwise be achievable without them.

When reviewing the applications of maps, understanding practitioners’ collective experience suggested that maps were useful for not only what they could show, but for the process of recording information. Alongside illustrating ecological and cultural
features, the process of mapping was found to be valuable for community engagement
around specific projects. This brought people together and got them excited about
projects being undertaken. Additionally, it was interesting to note that a number of
practitioners had faced similar challenges with the application of maps towards policy
and decision-making. The collective gathering of these experiences suggests that this is
a barrier to future applications, however strategies such as collaboration and inclusion
of Inuit in project design were suggested as contributing to effective solutions.

Finally, discussing ethical concerns with practitioners clearly illustrated
considerations when undertaking participatory mapping: one must consider how Inuit
knowledge is represented, used, and how it is stored. While a number of strategies were
described to address these challenges, informed consent and Inuit involvement and
ownership of projects were repeatedly raised.

While each interview contributed its own insights, it was the collective
experience of all key informants that generated the most insight into the role and value
of participatory mapping. Themes emerged that otherwise would not have been visible
on an individual basis. This included the role of participatory mapping – such as how it
was used to meet project objectives – challenges to participatory mapping, and
solutions to address challenges. Ultimately, these experiences reflect the value maps
have to academic researchers, and government organizations, and various Inuit and
non-government organizations.
Chapter 6: Discussion

Over the course of the previous two chapters, findings have been discussed from both the comprehensive literature review and key informant interviews. In this chapter I compare and contrast the findings from each, while also situating this research in the broader field of participatory mapping research. While sharing many similarities, results from the literature review and interviews often had differing narratives of the role and value of participatory mapping, so here I hope to draw out some of these unique insights. In so doing, I consider findings related to methodology, representation, applications, and challenges and opportunities.

6.1 Methodology

6.1.1 Similarities Between Literature and Interviews

Similarities shared between the literature review and interviews were methods employed and features being mapped. As described in Chapter 4, the dominant approach of undertaking participatory mapping was through the use of hard copy maps. This approach also emerged during the interviews with the majority of practitioners preferring the use of hard copy maps as a way to record Inuit knowledge. When further discussing this with practitioners, it became clear that this was not necessarily an indication of a ‘best practice’, rather it illustrated that the use of hard copy maps was the best fit for a particular project. This could be on account of researcher or community comfort levels with maps, or due to limited resources available to employ other approaches. This finding was similarly echoed when examining scales chosen. In both
the literature review and interview scales were chosen based on a combination of available base maps, participant comfort, and representation of study area.

Another similarity between the literature review and interviews was common features being mapped. In the literature review the most commonly mapped features included ecological information such as wildlife habitat or migration routes. Similarly, practitioners interviewed described these features as being some of the most commonly recorded.

In the broader participatory mapping literature, approaches to selecting methods are also quite varied. According to the IFAD (2009), the choice in participatory mapping methods or tools is dependent upon how the maps will be employed, their perceived impact, and the local resources available. Furthermore, Tobias (2009) describes how Indigenous communities around the world face vastly different access to resources, tools and technologies, and funding, which results in varied methods. Insights from this study go further in that the findings suggest that methods need to be developed in conjunction with communities, participants, and researchers on a project by project basis.

6.1.2 Differences Between Literature and Interviews

While literature and interviews described similar methodological choices, narratives diverged as interviewees went on to include a description of why particular methods were chosen over others, and key considerations necessary when undertaking participatory mapping. As a result, interviews provided a more holistic view of
participatory mapping, identifying considerations and barriers from the beginning to end of the research process for a particular project. In particular, interviews provided insight into the importance of relationship building, community engagement throughout the project, and importance of developing methods to meet specific project objectives.

While some Arctic participatory mapping literature was found to discuss the importance of relationship building (Fox, 2004), overall this theme was missing. During the interviews, however, a large emphasis on building positive relationships with participants prior to mapping was a reoccurring theme, with some practitioners even describing spending several weeks in communities to build these relationships prior to projects starting (Carter, 2016; Val, 2016). The narrative emerging from the interview results emphasizes the value of participant inclusion in projects, not only as a way to build relationships, but also in the process of planning and design. By including local organizations and input, practitioners found that they could better identify appropriate participants, interpret data, and ultimately this helped to generate findings that were more relevant for both communities and project objectives. While the identification of participants is often overlooked in the literature, practitioners described how relationship building and spending time in communities is often necessary to identify those who are best suited to answering specific questions. Additionally, building these relationships allows for a better understanding of internal politics that might exist in communities, enabling the researcher to identify areas of potential conflict and take measures to avoid conflicts from occurring.
In the broader participatory mapping literature, relationship building is often discussed. Windsor (2013) emphasized the need to build relationships with communities while using mapping for Community Based Participatory Research (CBPR). Similarly, Pinto et al. (2007) stressed the need to take community considerations into account when using participatory methodologies. In a South American Indigenous research context, the need to work with communities when designing projects, and identifying project goals is frequently emphasized (Peluso, 1995; Smith, 2003; Bryan, 2011). This suggests that there are few discussions on relationship building and collaborative research in an Arctic participatory mapping context, and that both in and out of a participatory mapping context building and maintaining relationships with participants is an essential element to participatory research.

Based on interview discussions, it was not only the importance of community engagement that was highlighted, but also the importance of ensuring ongoing engagement with participants throughout the project. In the literature review, participatory mapping was portrayed as an approach to record Inuit knowledge and later conduct analyzes on findings. During the NWHS (2004), mapping was described as “data collection”, and used a rigid coding scheme to identify exact harvest sites and amounts. Similarly the Coral Harbour Final Report (2014) described data recording procedures and later analysing these to show environmental information. In both instances, maps were depicted as a tool to collect information, and it seemed to exclude participants from the analysis phase. This narrative however, did not emerge during the interviews, rather practitioners stressed the need to involve participants throughout all
phases of research. This narrative is unique to interview findings as the literature reviewed did not often speak to how knowledge is interpreted. While this could relate to page requirements of publications, in the future including this information in published work will allow for a greater understanding of contextual elements.

6.2 Representation

In the broader literature of critical cartography and participatory mapping, the ways in which maps represent knowledge has long been described as imbued with power relations and representative of perceptions of reality, rather than reality itself (Harley, 1988; Pickles, 1995; Elwood, 2006; Griebel, 2013). Maps have been criticised as representing a biased view (Harley, 1988), therefore working in ways that benefit some groups, and disempower others (Dodge, 2015). Partially in response to critiques of conventional mapping techniques, and partially in response to a broader movement seeking local inclusion and empowerment (IFAD, 2009), participatory mapping emerged as a method to gather and represent local knowledge with the goal of community empowerment. This raises the question of whose perception of reality is being represented.

Interestingly, throughout participatory mapping literature focusing on Inuit knowledge research there has been little written on how representative maps are of knowledge being shared; rather the representative value of maps seems to be an implied assumption. While participatory mapping has been readily used across the Arctic, there is a distinct lack of discussion surrounding how representative maps are of
the Inuit knowledge they seek to portray. Therefore, the questions of whose perception of reality is being represented, and how well that perception is being represented, remain.

While literature discussed little of the representative value of participatory mapping, many practitioners described maps representing geographical or cultural information necessary to meet project objectives. While this did not inform whose story is being told, it did suggest that maps represent knowledge in the context of project goals and objectives. This draws clear parallels to literature findings which often described maps as a tool to meet project goals. I therefore suggest that it is equally important to assess how representative maps are of knowledge being shared as it is to assess how representative projects are of Inuit needs, values, and cultural concerns. In a Canadian context, there are many examples of participatory mapping being used as a method to benefit communities. Participatory mapping has been used in Nunavut and the Inuvialuit settlement region for Inuit land claims (Freeman, 1976; Brice-Bennett, 1977), or environmental management (Taylor, 2005; Kendrick and Manseau, 2008) to name a few. While it is difficult to know how representative the maps were of the knowledge being shared, the projects represented community needs, values, and concerns within their respective contexts. As such, project objectives should be examined as an indicator of how representative participatory mapping is of knowledge shared.

Also emerging from the interviews was a series of considerations that are necessary to improve or maintain how maps represent Inuit knowledge. These
considerations included how the story is being recorded, the impact of analysis and how this can influence the way information is represented, and whose story is being represented. Overall, these considerations challenge the idea of truth claims, or claims that maps are either representative or not. Maps produced can be representative of the information recorded in the context in which it was recorded. As such, maintaining the context of the stories shared is necessary in ensuring the Inuit needs, values, and concerns are met. This is not simply to make maps more or less representative, rather to make the reader aware of what the map is visualizing and how it was produced, and any associated limitations. Maps serve as a valuable medium through which to exchange knowledge. By ensuring the reader is aware of what the map is visualizing, knowledge is therefore more effectively communicated.

6.3 Applications

In looking at the applications of participatory mapping I was trying to better understand how mapping has been employed in Inuit knowledge research, and how that knowledge was working towards project objectives. Based on the similar and diverging narratives seen in the literature and interviews, I suggest that participatory mapping in an Inuit knowledge research context has largely acted to facilitate knowledge exchange, both as a medium to record, and a platform to discuss knowledge. These represent the two mechanisms through which knowledge is then applied towards project objectives.
Sharing a similar narrative, both the literature review and the interviews described numerous applications of participatory mapping. During the literature review mapping projects were categorized into five thematic groups based on map application: environmental management (Kendrick and Manseau, 2008), creating education and outreach material (Aporta, 2003), understanding environmental change (Laidler et al., 2010), land claims (Freeman, 1976), and facilitating interviews (Fox, 2004). This suggests that participatory mapping in the Arctic likely shares similar roles and values to projects undertaken elsewhere: to make visible associations between people and the land in ways that aim to benefit local populations.

Taking a critical view of mapping in the Arctic, one contribution from this study is identifying how participatory mapping contributes to project objectives being met. Overall, this took two distinct forms in both the literature and the interviews: the ability to record information; and, the ability to facilitate discussion around the topic.

As a tool to record information, participatory mapping has long been touted as valuable for gathering TEK, recording local geographical features, or illustrating land use practices (Berkes and Berkes, 2009; IFAD, 2009; Freeman, 1976). Additionally, much has been written on the ability of participatory mapping to include participants in the decision-making process by making local concerns visible (Dodge, 2015; IFAD, 2009). The literature review and interviews both demonstrated that participatory mapping contributed to Inuit knowledge research through its ability to document knowledge and oral histories that have strong spatial orientation. This information could be directly used to contribute to overall project objectives. Examples of this include Freeman
(1976) where land use and occupancy and supported land claims negotiations, or Etheridge (2017) describing the use of maps to record Inuit knowledge on sensitive areas to support the creation of parks. Therefore, one element of the role and value of participatory mapping in Inuit knowledge research is the ability of maps to record and visualize knowledge in a way that can affect change, or the ability of maps to include Inuit voices in decision-making processes.

The value of participatory mapping for facilitating interviews and enriching discussion went beyond simply recording information, facilitating conversation between researchers and participants; the maps helped engage the participants. In this regard, it is telling that a number of studies described the use of participatory mapping during interviews, but did not provide maps as a project output. For example, Pearce et al., (2011) used maps to understand hunters’ use of the land during interviews, but did not publish maps. This was also described as important in publications that integrated maps in results as well, such as Fox (2004) describing how maps were important by providing hunters with the opportunity to explain their observations on a map, and Laidler and Elee (2008) described using maps to enhance explanation and promote or spark memories. Similarly practitioners often described how participants would see the maps and instantly begin to tell stories, even before questions were asked (Carter, 2016). In this sense, maps acted as much as a medium through which to share knowledge as a tool to record information.

While literature and interview results both pointed to participatory mapping as valuable for documenting and sharing knowledge, one interesting narrative to emerge
during the interviews suggests that applications of participatory mapping are – and should be – highly contextualized according to project objectives. When asked about the applications of maps produced, several practitioners described how they felt maps were not used by communities after the project was complete. Maps were seen as valuable to these practitioners for what they could accomplish, but were not necessarily seen as valuable outside of the project context. This suggests that while maps might be valuable for their ability to document and exchange knowledge, map users must be conscious of the context in which information was originally recorded. Regardless of whether knowledge gathered is used in or out of the initial context in which it was recorded, the power of maps allows for this information to still be represented as fact (Dodge, 2015). From a critical cartographic perspective this can contribute to misrepresentations of reality on account of the way maps represent reality in a believable way (Harley, 1988; Dodge, 2015). While there seems to be a perception that participatory mapping can provide a definitive ‘map of knowledge’ that can be used for numerous purposes, the reality is that maps are not a ‘be all and end all’ approach to undertaking Indigenous knowledge research, rather they serve as an invitation to continue positive relationships and community empowerment.

6.4 Challenges and Opportunities

This section reviews challenges that have emerged in participatory mapping, and discusses possible options to overcome them.
6.4.1 Identifying Appropriate Methods

One challenge emerging from the literature and interviews was the identification of appropriate methods to meet project objectives. In the literature, maps were described as an approach to gathering knowledge to meet project objectives, however the mechanism through which to do this was not discussed. In the interviews, some practitioners described the difficulty in actually using maps to meet the objectives of the research being undertaken (Breton-Honeyman, 2016). While there is plenty of literature depicting methodological best practices (Chapin and Threlkeld, 2001; Tobias, 2009), the linkage between maps produced and applications is rarely discussed. Two pragmatic approaches emerged to address this challenge:

1) Design methods around project objectives. While this seems like common sense, it is important to have methods designed to address the explicitly defined requirements of the research problem. For example, Freeman (1976) designing methods explicitly around the legal requirements for land claims.

2) Work with communities to develop appropriate methods. In work mapping the impact of shipping in the Arctic, Carter (2016) described how she worked with community groups to establish methods prior to beginning the projects. This allowed for appropriate scales, types of base maps, and recording approaches to be selected in a way that best suited the community. Similar approaches were discussed by a few practitioners, suggesting that there is an opportunity for further work with communities in the selection of methods.
6.4.2 Meeting Multiple Objectives

Another challenge that emerged around the application of maps based on interviews was the difficulty in using knowledge gathered for multiple objectives. Examples of this might include using maps for academic research and policy development, or attempting to use maps to inform a number of wildlife management initiatives. The reasons were twofold: a fear of representing information out of context, and the difficulty in developing methods to meet multiple project objectives.

Practitioners described how when knowledge is recorded it is representing information in the context of a specific project. Although that knowledge may be useful for achieving other objectives, it was considered a challenge to use that information outside the original context in an appropriate and ethical way. While the risk of misrepresenting information is always a consideration, one narrative to emerge from the interviews highlights the importance of planning in advance to align project objectives and methodological approaches (Carter, 2016; Breton-Honeyman, 2016; Kemp, 2017; Regional Inuit Association Employee, 2017). This would include identifying a clear range of possibilities for how information will be used and ensuring participants are aware of these. While this may not address all potential future uses of participatory mapping, it will help to identify a range of possible uses.

6.4.3 Community Support

One final challenge described throughout the interviews pertains to the need to design projects that address community needs. According to Griebel (2016), often
communities feel burned out with a stream of research projects that lack tangible results; this leads to difficulty in ongoing engagement with communities, emphasizing the need for community engagement in all phases of projects (Hayes, 2016).

While representing a challenge, findings from this study indicate there is potential for future participatory mapping work to more fully engage with communities. Interviews highlighted the need to develop positive relationships with communities. In so doing, practitioners described being able to better integrate project design, representation, interpretation, and application elements of participatory mapping projects in meeting and representing Inuit needs and values. As participatory mapping work has the potential to have an impact on communities, there is further reasoning to ensure ongoing community engagement. While this might seem like common sense, challenges still persist on account of occasionally poor community involvement in Inuit knowledge research. As such, there is the continued opportunity to foster positive relationships with communities and participants that are taking part in research projects.
Chapter 7: Concluding Thoughts

In this project I explored the role and value of participatory mapping in an Inuit knowledge research context. Using a critical cartographic lens, I undertook a comprehensive literature review alongside key informant interviews, guided by four research questions: i) How has participatory mapping been used from the ILUOP to present (i.e. over the last 40 years), and how has it changed?; ii) To what extent has participatory mapping been used in sharing and exchanging knowledge in Inuit knowledge research?; iii) What key barriers and considerations exist in using participatory mapping?; and iv) What future opportunities exist for participatory mapping in an Inuit knowledge research context? This chapter summarizes key findings in relation to each of these key research questions. Additionally, I present some shortcomings of this project and considerations for moving forward. Finally, I conclude with a broader discussion on the role and value that participatory mapping can play in Inuit knowledge research.

7.1 Uses of Participatory Mapping in Inuit Knowledge Research over the Last 40 Years

When looking to understand the various uses of participatory mapping in Inuit knowledge research over the last 40 years I was looking to better understand two themes: how participatory mapping has been used as a method, and, why participatory mapping was chosen for undertaking knowledge research (applications).

Looking at methods chosen in participatory mapping work, a large diversity of approaches was identified as being used to both record and interpret Inuit knowledge.
Although using hard copy base maps appeared to be most common, there was still great diversity expressed in literature and interviews. This could be attributed to practitioners choosing methods based on factors such as study objectives, participant comfort levels with methods, or personal comfort levels with different approaches. However, what remained constant was the emphasis on relationship building and the inclusion of Inuit in all aspects of methodological design such as: methods selection, implementation, and interpretation of findings. Collectively, this study emphasized that there is no one size fits all approach, rather approaches should be chosen based on the best fit for the project, researcher, and communities involved in the research.

When looking at why participatory mapping was being used as a method in Inuit knowledge research, findings included the facilitation of land claims, environmental management, outreach and education, or recording climatic observations to name a few. Over the course of the last 40 years, applications have begun to shift. One emerging trend is a greater focus on recording Inuit knowledge and observations on environmental change. Overall however, applications of participatory mapping are largely focused on supporting environmental management or as a tool to facilitate interviews. While applications might vary and shift over time, one key finding from this study suggests that the role and value of participatory mapping in achieving project objectives has remained relatively constant as either a tool to record knowledge or stories, or as an approach to facilitate discussion on themes of interest.

The following findings on how participatory mapping has been used from ILUOP till present can be summarized by the following points:
1) Applications of participatory mapping are diverse, and have included objectives such as land claims, environmental management, planning processes, or cultural studies to name a few;

2) The mechanism through which participatory mapping is applied towards project objectives includes both what maps can record, but also how maps facilitate the process of recording information; and,

3) Applications of participatory mapping are contextualized within project objectives. As such, participatory mapping is not a static process, rather an iterative process of working with communities in an ongoing fashion.

Through these findings it can be interpreted that participatory mapping in an Inuit knowledge research context has largely been used in the process of knowledge exchange, acting both as a medium to record, and a platform to discuss knowledge.

7.2 Extent of Participatory Mapping for Knowledge Exchange and Documentation

When examining the role of participatory mapping for knowledge exchange and documentation I was looking to better understand how representative maps are of Inuit knowledge being shared, and whether maps serve as a reliable approach to facilitate knowledge exchange. While there was not much explicit discussion of considerations around knowledge representation in the literature, during the interviews there was much discussion on this theme. Through a diversity of practitioner responses, it seems there is agreement that participatory mapping contributes greatly to knowledge exchange, albeit within the context of particular projects and their goals. This extended
beyond just representing knowledge through maps, and also included the way maps facilitate knowledge exchange during the interview process, allowing for memories to be jogged and further explanation of subject matter. These findings on the role of participatory mapping in knowledge exchange and documentation can be summarized by the following points:

1. How maps facilitate knowledge exchange and discussion is not just predicated on whether maps are representative of stories shared. Instead, the ability of maps to generate discussion and spark exchange is based on how project objectives are defined, and whether these objectives meet Inuit needs, values, and concerns.

2. Maps will never be fully representative of oral histories and Inuit knowledge, however they can still be valuable in exchanging knowledge in a cross-cultural manner, provided contextual elements are retained and effectively communicated.

These main findings illustrate the importance of including Inuit in all phases of project design, development, analysis, and communication in order to support meaningful Inuit knowledge representation according to project context. Therefore, maps can be considered representative of the project objectives as much as they are of Inuit knowledge being shared. It is therefore important to critically assess projects themselves to answer the question of whose story is being told.

7.3 Barriers and Considerations of Participatory Mapping
Another objective of this study was to identify what barriers and considerations exist in the implementation of participatory mapping initiatives. Stemming from a long history of colonial use, mapping has been criticized as a tool of empire (Harley, 1988). As such, I was looking to identify what considerations were necessary to avoid misrepresentation of Inuit knowledge, and considerations that would allow projects to meet their objectives. Overwhelmingly two major considerations emerged in the interviews. The first related to keeping the information recorded in the context in which it was recorded in. Whether relating to discussions of representation, or discussions of applications of participatory mapping, practitioners stressed the importance of maintaining the context of information. The second consideration relates to the involvement of communities and participants in mapping projects. Nearly all practitioners described the need for communities to be involved, and this emphasis extended beyond simply informing communities about research projects or sharing results. Included was integrating participant voices into the project design phase, the selection of methods, the analysis of knowledge gathered, and in the applications of finished products.

7.4 Future Opportunities of Participatory Mapping

One final goal of this project was to identify future opportunities for participatory mapping. Based on this research, opportunities exist to address two central challenges that were identified. The first pertains to how participatory mapping is applied to meet project objectives. One challenge discussed throughout this research is linking methods to project objectives. While this might be common sense, going
farther to identify exactly how maps are going to contribute and be applied to project objectives can improve the relevance of maps created. Examples of where this could be effective include the development of policy or for land use planning and decision-making processes. A secondary challenge described in the interviews was engaging communities in the projects. While it was recognized that projects will have improved results the more involved Inuit are in the entirety of the project, often it was recognized that this is difficult to implement.

7.5 Study Shortcomings, Contextual Considerations, and Future Research

While many findings have emerged that help to better understand the role and value of participatory mapping, several limitations are acknowledged within the scope of this study.

There are two main shortcomings in the literature review. First, it has become clear that there are several projects that have used participatory mapping but I was unable to find reference to them in the literature. Interviewed practitioners discussed projects that they had heard about which had not published any findings. As a result, it must be noted that the findings derived from the literature review are only reflect projects that show up in the literature. In future research it would be interesting to integrate a broader analysis of projects undertaken, perhaps with the use of a detailed survey being sent to all known practitioners.

The second literature review shortcoming related to the focus of publications reviewed. Often publications would describe why a project was undertaken, methods
involved, and results, but lacked discussion of how participatory mapping facilitated the achievement of project objectives. While this study identified participatory mapping as a mechanism that facilitates discussion and recording of Inuit knowledge (i.e. as both process and outcome), it was less clear how participatory mapping has been – or can be – applied to project objectives. In future work it would be interesting to more explicitly investigate this connection, which could also help to provide insights into representation, ethical, and applied aspects of mapping.

One final limitation acknowledged in relation to conducting key informant interviews pertains to the practitioners interviewed. As the research question was in essence an examination of participatory mapping for Inuit knowledge research, this favoured participation from researchers rather than communities. Despite researchers having varied backgrounds, including researchers representing government organizations, Inuit organizations, not for profit organizations, and northern institutes of public governance, it must be considered that these findings do not necessarily reflect those of Inuit or communities. As such, future research opportunities exist to learn from community members across the Arctic about Inuit perceptions of participatory mapping as a research method.

7.6 Conclusions: The Role and Value of Participatory Mapping in the Arctic

Emerging out of critiques of the cartographic process (Harley, 1988) and the broader push towards more collaborative research methods (IFAD, 2009), participatory mapping has sought to represent the associations between people and the land, engaging local stakeholders and legitimizing local knowledge (Ashby, 2003).
Participatory mapping was thus designed as an approach to work towards exacting positive change (Wood et al., 2010). While used extensively in the Arctic, no previous study critically assessed the role and value of participatory mapping in an Inuit knowledge research context.

Literature review and interview findings indicate that the role and value of participatory mapping is twofold: to record Inuit knowledge, and to facilitate discussion surrounding themes of interest. Ultimately, participatory mapping in itself does not necessarily translate directly into the positive changes envisioned in using a participatory approach, rather it serves as a tool and process that can support potential change. Ultimately, it is up to researchers and communities to ensure participatory mapping is being used towards its desired objectives. Maps do not solve a dilemma, rather they offer a means to collaboratively explore and work through a dilemma (Bryan, 2011). In this sense, the role and value of participatory mapping in an Inuit knowledge research context can be considered an invitation through which to continue more collaborative research, ultimately exacting the positive change participatory mapping was originally designed to do.
References


Aporta, C. (2005). From map to horizon; from trail to journey: Documenting Inuit geographic knowledge. 29(1-2), 221-231.


Fox, S. (2004). When the weather is uggianaqtuq: Linking Inuit and scientific observations of recent environmental change in Nunavut, Canada


Guy, P., Canadian International Development Agency, Dalhousie University. School for Resource and Environment Studies, University of the Philippines at Los Banos. Institute


Northern Researcher. (2016). Email Correspondence. Interviewed by: Alex de Paiva. Date: October 4th, 2016.


NWMB. (2008). Igloolik Pilot Project. Prepared as a part of the Nunavut Coastal Resources Inventory. Department of Economic Development and Transportation Fisheries and Sealing Division (now Department of Environment).
NWMB. (2014). Coral Harbour Inventory. Prepared as a part of the Nunavut Coastal Resources Inventory. Iqaluit, NU: Nunavut Wildlife Management Board.


Appendix 1: Recruitment Email

Dear ______________,

My name is Alex de Paiva, I am a Master’s student at Carleton University working on a project to learn about the role and value of participatory mapping in an Inuit knowledge context. Gita Ljubicic is my supervisor at Carleton, and she is leading the broader project called “Mapping the Journey: Inuit perspectives on the role and value of participatory mapping” (please see the attached Project Overview).

I am looking to conduct interviews with individuals who have extensive academic, government, or other professional experience with participatory mapping. You have been identified as an excellent potential key informant for this project, based on your work with ______________.

I’m writing to request an hour of your time for a phone or skype interview (or in person if the individual is based in Ottawa) to discuss your approaches to and applications of participatory mapping in an Inuit knowledge context. Please let me know if you may be interested and available for an interview at some point over the summer or fall. I will then follow up with more details and to determine a convenient time. Please let me know if you prefer phone or email for future correspondence.

I look forward to hearing from you, and thank you in advance for your consideration. Your contributions to this project would be greatly valued.

Sincerely, Alex

Alex dePaiva
MA Candidate
Appendix 2: Interview Guide

Key Informant Interview Guide for “Mapping the Journey” project

This interview guide is meant to facilitate semi-directed interviews with key informants to learn about their perspectives on the role and value of participatory mapping in an Inuit knowledge context. Questions outlined here are not intended to be used in a rigid way, instead they are meant to help facilitate discussions on the topic while addressing key themes of this project. The numbered questions represent broader questions and themes to be discussed, with the letters representing potential sub-questions, discussion points, or prompts to facilitate discussion.

Opening Overview

1) Provide the context and goals of the project, key aspects of informed consent in order to proceed (i.e. to be interviewed, and type of recording)
   a. use “Project Overview” and “Interview Overview” as guide

Background

1) Can you please begin by telling me a little bit about your current position, responsibilities and how participatory mapping is involved?
   a. Directly involved in conducting participatory mapping?
   b. In a position of using/applying the results of participatory mapping?
   c. What Inuit communities or organizations are you working with, and for what purpose?
2) When did you start using participatory mapping?
   a. In what capacity (position/role)?
   b. With what Inuit communities or organizations?
   c. For what purpose?
   d. What other kinds of mapping activity/involvement over the years?
      Any other Indigenous groups/organizations?

Methods

1) I’m interested in learning how you were using participatory mapping as a research or knowledge documentation method, can you please describe this in relation to your current work, and any past projects (if different approaches have been used over time)?
   a. General methodological approach?
   b. Key documents/people you have relied on to develop your methodological approach?
   c. Relationship with communities you were working?
d. How were communities/individuals involved/selected?
e. Scale and type of basemaps used?
f. Hard copy or digital? Explain associated procedures

2) Can you please discuss any strengths or limitations you have identified, or challenges faced, in relation to conducting or using participatory mapping as a research method, for example around:
   a. Scale?
   b. Basemap?
   c. Map medium (hard copy/digital) and setup?
   d. What types of information were you trying to record?
   e. Types of interactions to facilitating mapping (interviews as individual or groups, locations, context of meetings)?
   f. Who is conducting interview?
   g. Who is drawing the features?
   h. Labelling/coding strategies?
   i. Who is digitizing?
   j. Software used (for direct-to-digital mapping, or digitizing/map creation)?
   k. How many people involved in a mapping session?
   l. Translation?
   m. Maps’ ability to facilitate knowledge sharing?
   n. Keeping track of the essence/context of what is being shared while mapping vs. just listening?
   o. Other methods of recording at the same time (photos, video, audio)?
   p. How comfortable were Inuit with using the maps?

3) Have the methods you have used for participatory mapping changed over time? Please describe (in relation to similar issues above, and in context of what projects/goals)?

Representation

1) How well do you feel that participatory mapping processes (as part of interviews, group discussions, or other kinds of meetings) can document and represent the kinds of information people wanted to share?
   a. Opportunities/benefits to recording stories using points/lines/polygons?
   b. Accuracy and precision of spatial features, what is acceptable, for what purpose?
   c. Any kind of post-processing, visualization tools, or spatial analysis/manipulation you use on mapping results? (i.e. any alterations to original features drawn)?

2) What strategies have you used to maintain the context of stories or discussions associated with appropriate spatial features?
a. Are there some things that people couldn’t or wouldn’t map? Why?
3) How have you tried to represent time in relation to features drawn (or dynamic environments/features/movements)?

Applications

1) Who is working with the end results of participatory mapping sessions, for what purpose?
   a. How were the mapping results shared?
2) What were the goals for applications of mapping results?
   a. Research results/publications
   b. Informing decision-making
   c. Education
   d. Land claims negotiations
   e. Formalizing Inuit contributions to official maps
3) How well has participatory mapping facilitated your application goals (for different roles/organizations/projects) or the goals of how communities wanted to see info used?

Ethics

1) What kinds of ethical considerations do you emphasize, or find challenging, in relation to methods, representation, or applications of participatory mapping?
   a. Informed consent?
   b. Documenting ecologically or culturally sensitive information?
   c. Sharing information within or beyond the communities, with what kinds or organizations?
   d. Approvals for future uses of information?
   e. Storage and access of original mapping information?
   f. Concerns over misuse/misrepresentation?
   g. Mapping as rooted in colonial practice, or counter-mapping efforts?
   h. Cultural appropriateness of using participatory mapping?
   i. Any tensions or discomfort expressed by Inuit in being asked to participate in mapping efforts? What were the reasons, how were these addressed?

Lessons Learned/Best Practices

1) What would be some of the most prominent challenges or opportunities you have faced in regards to using participatory mapping in an Inuit knowledge context?
   a. What worked well, what not so well?
   b. Lessons learned?
c. What would you suggest as best practices for others starting similar projects?

Wrap-up

1) Anything else you’d like to share, that you may want to elaborate on, or that I may have missed asking?

2) Do you have any specific reports or publications that share the results of your various kinds of participatory mapping work, or that describe the methods you use and procedures you follow?
   a. Are these publicly accessible?
   b. Suggested sources/websites?
   c. Can you send links/docs to me directly?

3) Is there anyone else you recommend we speak with who also has extensive experience working with Inuit communities and using participatory mapping techniques?

4) Would you be willing to be contacted for a follow-up interview either by myself, Gita (my supervisor) or Joel (Research Associate with the project), for any questions requiring clarification or further discussion?
Appendix 3: Consent Form

CONSENT FORM

Mapping the Journey: Inuit perspectives on the role and value of participatory mapping

I have received the information email and project overview that introduces this project and consent form. I have been informed of what it means to participate in this project, and I am willing to participate in an interview in support of this project. I agree that my contributions can be used in the project under the following conditions.

Identification (check one)
I remain the owner of the information and opinions I have contributed, but for the publication of project results and sharing this information with others I wish to be identified in the following way:

- [ ] I DO want my name to be used, so that information I share is credited to me
- [ ] I DO NOT want my name to be used, but information that I share will be credited confidentially as agreed upon (example credits: “University Professor, 2016”, “Territorial Government Employee, 2016”, “Independent Consultant, 2016”, “Regional Inuit Association Employee, 2016”)

Recording
I am willing to have my contributions to the project recorded in the following way:

- [ ] I AGREE to having interview discussions recorded using a digital audio recorder
- [ ] I DO NOT AGREE to audio recording the interview, I prefer written or typed notes only

Sharing of information
I understand that information and opinions I share will be included in the results of this project and will be shared publicly in the form of reports, publications, or related project outputs (e.g. posters, presentations, news items, website postings on the Internet). Results of this project may only be used for non-commercial or educational purposes. To make my contributions publicly available, I agree to (check one):

- [ ] have my contributions shared directly (i.e. with the potential for direct quotes)
- [ ] only have my contributions shared in a summarized or combined form

A part of this project relates to education and outreach about participatory mapping ethics and methods. Select audio clips may be compiled to create online podcasts, or full interview recordings provided online, in an effort to share knowledge and lessons learned broadly. I understand that I will receive a copy of the audio recordings and written transcript of interview discussions, and any requested edits will be made, prior to any release of recordings. I understand that I will also have the opportunity to confirm which Creative Commons License (https://creativecommons.org) I want associated with my recordings. I agree to share my original recordings as indicated below (check one):

- [ ] Full interview
- [ ] Select clips, with my approval
- [ ] Not at all

I understand that I may change my levels of consent, and/or that I may withdraw from participating in this project, within two months of reviewing my contributions and/or initial results. For any changes or withdrawal I understand I need to contact the researcher who interviewed me ( ) or the Project Leader (Gita Ljubicic) directly. All contact details are included on the reverse page.

I have had my questions about this form and this project addressed to my satisfaction. I understand the levels of consent provided here, and I freely agree to participate in the project as outlined above.
Participant Consent:
Print name: ___________________________  Sign name: ___________________________
Verbal consent, check here [ ]  Date(s): ___________________________

Researcher Consent:
As you agree to participate in this project, I, ___________________________ promise to respect the context of the knowledge and opinions you contribute to this project, and the terms of this consent form.

If you have any questions or concerns about this project, or the consent you have provided, please contact the researchers involved, Nunavut Sivuniksavut, Nunavut Research Institute, or the Carleton Ethics Committee:

Project Leader
Gita Ljubicic
Dept. of Geog. and Env. Studies, Carleton University
125 Colonel By Drive, B349 Leeb Building
Ottawa, Ontario K1S 5B6
Phone: (613) 520-2600 x2566
Email: gita.ljubicic@carleton.ca

MA Researcher
Alex dePauw
Dept. of Geog. and Env. Studies, Carleton University
125 Colonel By Drive, B349 Leeb Building
Ottawa, Ontario K1S 5B6
Phone: (613) 520-2600 x3132
Email: AlexDepauw@e-mail.carleton.ca

Carleton University Research Ethics Board
Louise Heisley (Chair) and Andy Adler (Vice-Chair)
Carleton University Research Ethics Board
125 Colonel By Drive, 511 Tory Building
Ottawa, Ontario K1S 5B6
Phone: (613) 520-2517
Email: ethics@carleton.ca

Interview Participant
Name: ___________________________
Address: ___________________________
Phone: ___________________________
Email: ___________________________

Interview recording file name(s): ___________________________

Notes:
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
## Appendix 4: Practitioner Backgrounds and Areas of Experience

<table>
<thead>
<tr>
<th>Name</th>
<th>Background</th>
<th>Areas of Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amos Hayes</td>
<td>Technical manager for a geomatics research centre, has predominantly worked on technological developments for recording, visualizing, and storing Indigenous knowledge and other kinds of information</td>
<td>Academic/Technical</td>
</tr>
<tr>
<td>Bill Kemp</td>
<td>Worked with participatory mapping since the early 1960’s. Participated in the ILUOP, recorded info for the James Bay land claims, and continues to work as a consultant for diverse Indigenous organizations</td>
<td>Academic/Consulting</td>
</tr>
<tr>
<td>Brendan Griebel</td>
<td>Used participatory mapping as a research method during academic work and continued use with work undertaken for an Inuit heritage organization</td>
<td>Academic/Northern Non-Profit Organization</td>
</tr>
<tr>
<td>Claudio Aporta</td>
<td>Has used participatory mapping for both place names and recording trails as a part of academic work</td>
<td>Academic</td>
</tr>
<tr>
<td>Erik Val</td>
<td>First used participatory mapping when working on the ILUOP. Has since used participatory mapping for the James Bay and Northern Quebec agreements, and a variety of parks related mapping through his career, and more recent consulting with various Indigenous organizations</td>
<td>Consulting</td>
</tr>
<tr>
<td>Gita Ljubicic</td>
<td>Has used participatory mapping for understanding Inuit knowledge of sea ice, caribou, and diverse land uses as a part of academic research</td>
<td>Academic</td>
</tr>
<tr>
<td>Northern</td>
<td>Employee of a Northern research organization who has experience with a variety of participatory research methods, including participatory mapping</td>
<td>Northern Government Employee</td>
</tr>
<tr>
<td>Organization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jared Fraser</td>
<td>Works as a GIS analyst who conducts use and occupancy mapping to facilitate community input into planning exercises</td>
<td>Northern Institution of Public Governance</td>
</tr>
<tr>
<td>Regional Inuit</td>
<td>Research manager and spatial projects coordinator on a number of projects to facilitate documentation of Indigenous ecological knowledge</td>
<td>Northern Institution of Public Governance</td>
</tr>
<tr>
<td>Association</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaitlin Breton-</td>
<td>Has used participatory mapping to gather information on wildlife patterns and human marine use as part of academic research, and with the goal of shaping policy decisions as part of her current work</td>
<td>Academic/Northern Institution of Public Governance</td>
</tr>
<tr>
<td>Honeyman</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Krista Zawadski</td>
<td>Has used participatory mapping for documenting cultural knowledge and conducting community consultations in both current work positions and previous work with the Government of Nunavut</td>
<td>Inuit Organization</td>
</tr>
<tr>
<td>Miguel Chenier</td>
<td>Has been involved in various community consultations using participatory mapping</td>
<td>Northern Institution of Public Governance</td>
</tr>
<tr>
<td>Natalie Carter</td>
<td>Has used participatory mapping to document implications of marine transportation corridors for Arctic communities, and communities’ recommendations for development and management of the corridors</td>
<td>Academic</td>
</tr>
<tr>
<td>Northern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Researcher</td>
<td>Has used participatory mapping as a way to record cultural and ecological information</td>
<td>Academic/Northern Non-Profit</td>
</tr>
<tr>
<td>Suzanne Etheridge</td>
<td>Has used participatory mapping as a way to delineate proposed park boundaries</td>
<td>Northern Government</td>
</tr>
</tbody>
</table>